

Elis: THE *Byrem* *Jun*
Merchant's Companion,

A N D

Tradesman's Vade Mecum:

O R,

PRACTICAL ARITHMETICK,

B O T H

VULGAR and DECIMAL,

Rendered more clear, short, and easy, than ever before.

I N W H I C H

Most of the RULES of ARITHMETICK are altered to Advantage, and NEW METHODS laid down, whereby the young Scholar may, with Ease, become a Proficient in a short time.

Together with An

A P P E N D I X

For those who are advanced in ACCOMPTS, Containing MENSURATION, both SUPERFICIAL and SOLID; as also many CONTRACTIONS, tho' none that are meerly curious, but such as may be serviceably applied to

TRADE AND MERCHANTISE.

The Whole necessary for all Men of Business, Teachers of ACCOMPTS, and their Scholars.

By JOHN SAXTON,
Writing-Master and Accomptant in Manchester.

MANCHESTER:

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M D C C X X X V I I .



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T H E

P R E F A C E.



OMMERCE is so useful to Mankind, and the KNOWLEDGE of NUMBERS so necessary to the carrying it on, that many Persons have, of late, employed themselves in endeavouring to render *Practical Arithmetick* more short and easy. The same laudable motive will, I hope, be a sufficient Excuse for
my

iv *The P R E F A C E.*

my troubling the World with this Performance ; for I make bold to assure the Reader, that if I had not imagined I had made very many, and very considerable Improvements in most Parts of this excellent Art, the following Papers should not have gone to the Press, but have been committed to the Flames.

I have laid it down as a Maxim to myself, never to alter for altering sake ; and therefore, tho' I have made so many Alterations, some in almost all the Rules of *Arithmetick*, yet I flatter myself they will all be found to be for the better ; for I have never departed

The PREFACE. v

departed from the common Methods, but in order to clear up Obscurities, to render Difficulties easy, or make tedious Operations short and concise. In some Instances I have been capable of making only one of these Improvements, in others more, in many all.

I could easily prove the Truth of this, by comparing my Methods with those of other Authors, even the latest that have hitherto appeared, and by setting down their and my operations of the same Questions; but as this would be swelling the Preface to a troublesome Length,
and

vi *The P R E F A C E.*

and moreover look too much like triumphing over all the Authors who have troden the beaten Path before me, I choote rather to wave such an ungrateful Proceeding, and willingly submit the Comparison to the impartial judgment of the sagacious Reader.

I should be guilty of great Injustice, if I did not own my Obligation to Mr. HODGKIN for his Invention of the Two-Shilling Principle in his Book of *Practice*, which I acknowledge gave me the first Hint of seeking for farther Light and Advantage. The world is greatly indebted to
that

The P R E F A C E. vii

that ingenious Gentleman for his useful discovery ; and I doubt not but he is a Person of such candour, that he will be pleased to see, I have not only considerably amended even his own Rule of *Practice* ; but, by extending his Principle to other Rules, have quite altered and improved the whole System of *Practical Arithmetick*, and set it upon a different, but better Bottom.

Every one knows, how troublesome Errors of the Press are in Works of this Nature : For this Reason I have choten to print the following Book under my
own

viii *The P R E F A C E.*

own Eye at the Place of my Residence, rather than at *London*, where possibly the Printing Work might have been neater performed; but I imagine the Reader will think that Advantage sufficiently balanced, by the Book's being (as I hope) free from Typographical Faults, and therefore not wanting a Table of *Errata*.



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Hundreds of Millions,
Tens of Millions,
Thousands,
Hundreds,
Tens,
Units.

Be-
third



NUMERATION

Teacheth to Read and Write any Number.

The TABLE.

Hundreds of Millions,	Tens of Millions,	Millions,	Hundreds of Thous.	Tens of Thous.	Thousands,	Hundreds,	Tens,	Units,	
							1	1	One,
							2	1	Twenty 1,
							3	2	1 Three Hundred 21,
							4	3	2 1 Four Thousand 321,
							5	4	3 2 1 54 Thousand 321,
							6	5	4 3 2 1 Six Hundred 54321,
							7	6	5 4 3 2 1 Seven Millions 654321,
							8	7	6 5 4 3 2 1 87 Millions 654321,
							9	8	7 6 5 4 3 2 1 Nine Hundred 87654321.

To Read any Number of Figures.

R U L E.

Begin at the Right hand, and set a prop after every third Figure throughout the whole Number; then set
B over

Numeration.

over every other prop, first a Figure of one, then a 2; then a 3, &c. thus

⁴47.³614.²167.¹231.671.678.161.416.714

Then call that Figure on the Right hand of every prop Hundreds; the other two Figures on the left hand call Thousands, if there is no Figure over the prop; but if there is, then that Figure shews how often you are to say Millions, therefore the above Figures are to be thus read (*viz.*) 47 'Million of Millions of Millions' of Millions, (or Quadrillions,) 614 'Thousand 167 Million of Millions of Millions, (or Trillions,) 231 'Thousand 671 Million of Millions, (or Billions,) 678 'Thousand 161 Millions, 416 'Thousand 714.

Set down in words the Numbers following, *viz.*

Example 1.

67.141

Answer, Sixty seven Thousand, one Hundred and Forty one.

Example 2.

³47.161.411

Answ. Forty seven Millions, one Hundred Sixty one 'Thousand, four Hundred and Eleven;

Example 3.

²4.701.416.¹147.101

Answ.

Answ. Four Million of Millions, (or Billions) seven Hundred and one Thousand four Hundred and sixteen Millions, one Hundred forty seven Thousand, one Hundred and one.

To Write down any Number of Figures.

R U L E.

Place a prop after Millions and Thousands, always observing that three Figures follow every prop; and when you have writ down the Number, set over every other prop first a Figure of 1, then a 2, &c. as above.

Write down in figures the Numbers following, viz.

Example 1.

Eighty two Thousand, four Hundred and Eighty two.

Answ. 82.482

Example 2.

Six Hundred Thousand.

Answ. .600,000

Example 3.

Four Millions, three hundred Thousand, five hundred and sixty nine.

Answ. 4.300.569

Exam-

*Numeration.**Example 4.*

Nine Hundred Millions

Answ. ¹.900.000.000*Example 5.*

Eighty two Thousand and four Millions, three hundred and four Thousand, four hundred and nine.

Answ. ¹82.004.304.409*Example 6.*

Seven hundred ninety six thousand, four hundred and nine Million of Millions, (or Billions,) thirty two thousand five hundred and four Millions, eighty two thousand and four.

²¹.796.409.032.504.082.004.*Addition*

223

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How

A D D I T I O N

Of whole Numbers.

A DDITION teacheth to *collect*, or *add* several Numbers into one Sum.

R U L E.

Place every figure in it's proper place, as Units under Units, Tens under Tens, &c; then begin at the Units place, and *add* together that row; and if their Sum be under Ten, set it down in the Units place; but if their Sum be above Ten, set down the Units, and if exactly Ten or Tens, set down a Cypher, and for every Ten, carry one to the place of Tens or next row; and proceed with it and all the rows as in the row of Units, only observing in the last row to put down the whole Sum.

Example 1:

		<i>Pounds.</i>
Suppose I have Owing to me for	Cambrick	478
	Holland	616
	Fustian	709
	Muslin	198
	Thread	495
	Handkerchiefs	609

How much is due to me in all ? 3098 *Answ.*

Exam-

Addition of

Example 2.

Suppose in the ballancing of my Accompts, I find there is owing me

	<i>Pounds.</i>	
By {	Andrew Swift	164
	John Smart	67 19
	Simon Slow	61
	Nicholas Grave	419
	Anthony Plod	1675
	Peter Short	393

How much is owing to me in all? 9431 *Answer*

Example 3.

Admit a Merchant has by him the following Sums of Money, viz:

Pounds

1641

349

96

781

9168

146

987

What has he by him in all?

13168 *Answer.*

Exam-

Whole Numbers.

7

Example 4.

I find What is the Sum of 161 Pounds, and 41 Pounds,
and 9841 Pounds, and 614 Pounds, and 18 Pounds?

$$\begin{array}{r}
 \text{Pounds.} \\
 161 \\
 41 \\
 9841 \\
 614 \\
 18 \\
 \hline
 10675 \text{ Answ.} \\
 \hline
 \end{array}$$

Answ.

Example 5.

Sum Bought 1647 Yards of Cloth, and 984 Yards,
and 624 Yards, and 8710 Yards, and 161 Yards, and
9 Yards, and 945 Yards: What Number of Yards
was Bought in all?

$$\begin{array}{r}
 \text{Yards.} \\
 1647 \\
 984 \\
 624 \\
 8710 \\
 161 \\
 9 \\
 945 \\
 \hline
 13080 \text{ Answ.} \\
 \hline
 \end{array}$$

all?

Proof of Addition.

Begin at the Top, and cast downwards in the same
manner as you did upwards; and if the same Sum
be produced, the work is right.

Mult.



MULTIPLICATION of

Whole Numbers.

MULTIPLICATION (which is only a concise or short way of *Addition*) teacheth to increase any Number any Number of Times, by *Multiplying* one Number by the other, as in the Rule following.

The greater of the two Numbers which are to be *Multiplied* together, is usually call'd the *Multiplicand*, the lesser the *Multiplier*, and what these two produce is call'd the *Product* or *Answer*.

R U L E.

Set the *Multiplier* under the *Multiplicand*, Units under Units, Tens under Tens, &c; then *Multiply* every figure in the *Multiplicand* by the Units figure in the *Multiplier*, carrying one for every ten as in *Addition*. In the same manner *Multiply* by every figure in the *Multiplier*, observing to place the first figure of every *Product* under that figure which you *Multiply* by; then *add* together the several *Products*, and that Sum will be the *Product* required.

The

The TABLE.

1	2	3	4	5	6	7	8	9	11	12
2	4	6	8	10	12	14	16	18	22	24
3	6	9	12	15	18	21	24	27	33	36
4	8	12	16	20	24	28	32	36	44	48
5	10	15	20	25	30	35	40	45	55	60
6	12	18	24	30	36	42	48	54	66	72
7	14	21	28	35	42	49	56	63	77	84
8	16	24	32	40	48	56	64	72	88	96
9	18	27	36	45	54	63	72	81	99	108
11	22	33	44	55	66	77	88	99	121	132
12	24	36	48	60	72	84	96	108	132	144

The preceeding Table must be learned perfectly by heart.

Exam.

*Multiplication of**Example 1.*

What is 5 times 474 ?

Multiplicand 474*Multiplier* 5Product 2370 *Answ.**Example 2.*

What is 8 times 637 ?

Product 5096 *Answ.**Example 3.**Multiply* 637 by 12.

12

7644 Product

*Example 4.**Multiply* 345 by 14.

14

1380 Product by 4
345 Product by 10

4830 Product by 14

*Example 5.**Multiply* 7141 by 16.

16

42846

7141

114256

*Example 6.*What is the Product of
603 Multiplied by 18 ?

18

4824

603

10854

Exam-

Whole Numbers.

11

Example 7.

What is the Product of
1416 Multiplied by 27?

$$\begin{array}{r} 1416 \\ \times 27 \\ \hline 9912 \\ 2832 \\ \hline 38232 \end{array}$$

Product.

Example 8.

What is the Product of
4053 Multiplied by 63?

$$\begin{array}{r} 4053 \\ \times 63 \\ \hline 12159 \\ 24318 \\ \hline 255339 \end{array}$$

Product.

Example 9.

If I Multiply 1614 by 84, what will the Product be?

$$\begin{array}{r} 1614 \\ \times 84 \\ \hline 6456 \\ 12912 \\ \hline \text{Product } 135576 \end{array}$$

Note, When either the *Multiplieand* or *Multiplier*, or both, have one or more Cyphers at the right hand; place the first figures next the right hand under each other, &c; then *Multiply*, neglecting the Cyphers; when all is *Multiplied*, add the particular Products together, and fix to the right hand of their Sum all the Cyphers, which are in both the *Multiplieand* and *Multiplier*.

Example 10.

What will the Product be
if I Multiply 6411 by 20?

$$\begin{array}{r} 6411 \\ \times 20 \\ \hline \end{array}$$

Product 128220

Example 11.

What will the Product be
if I Multiply 3061 by 600?

$$\begin{array}{r} 3061 \\ \times 600 \\ \hline \end{array}$$

Product 1836600

Exam-

Multiplication of

Example 12.

Multiply 3416 by 560?

$$\begin{array}{r}
 3416 \\
 \times 560 \\
 \hline
 20496 \\
 17080 \\
 \hline
 1912960
 \end{array}$$

Example 13:

Multiply 46711 by 7200?

$$\begin{array}{r}
 46711 \\
 \times 7200 \\
 \hline
 93422 \\
 326977 \\
 \hline
 336319200
 \end{array}$$

Example 14.

What is the Prod. of
46150 Mult. by 245?

$$\begin{array}{r}
 46150 \\
 \times 245 \\
 \hline
 23075 \\
 18460 \\
 9230 \\
 \hline
 \end{array}$$

Answ. 11306750

Example 15.

What is the Prod. of 360950
Multiplied by 30500?

$$\begin{array}{r}
 360950 \\
 \times 30500 \\
 \hline
 180475 \\
 108285 \\
 \hline
 \end{array}$$

Answ. 11008975000

Example 16.

400761000 to be Multiplied by 3006700 what is the
Product?

$$\begin{array}{r}
 400761000 \\
 \times 3006700 \\
 \hline
 2805327 \\
 2404566 \\
 1202283 \\
 \hline
 \end{array}$$

Product. 1204968098700000

Proof

Proof of Multiplication.

R U L E.

Multiply the Multiplier by the Multiplicand, and if the Product be the same as before, the work is right : This way of proving this Rule is best, till we come to Division.

The last *Example* proved

$$\begin{array}{r}
 3006700 \\
 400761000 \\
 \hline
 30067 \\
 180402 \\
 210469 \\
 120268 \\
 \hline
 \hline
 \end{array}$$

Product 1204968098700000 the same as before.

 A B B R E V I A T I O N S,

Or a short method of Multiplying.

C A S E I.

When there is a figure of 1 in the Multiplier.

R U L E.

PLACE the figure of 1 in the *Multiplier* under that figure in the *Multiplicand*, which stands next your right hand ; then *Multiply* by every figure in the *Multiplier* except that figure of 1, and observe that the first figure of every Product stands under it's *Multiplying Figure* : when all is *Multiplied*, add all the figures together, except the *Multiplier*.

Note,

Multiplication of

Note. To prevent adding in the Multiplier, with the rest of the figures, you may put a dash through it.

Example 1. *Example 2.* *Example 3.*

Multiply 345 by 14. Mul. 7141 by 16. Mul. 603 by 18.

$$\begin{array}{r} \text{14} \\ 345 \\ \hline 1380 \\ \hline 4830 \\ \hline \end{array}$$

$$\begin{array}{r} \text{16} \\ 7141 \\ \hline 42846 \\ \hline 114256 \\ \hline \end{array}$$

$$\begin{array}{r} \text{18} \\ 603 \\ \hline 4824 \\ \hline 10854 \\ \hline \end{array}$$

Compare these three last Examples with Example 4th, 5th, and 6th, in the 10th page.

Example 4. *Exam. 5.* *Exam. 6.*

Multiply 876 by 71. Mul. 146 by 111. Mul. 214 by 131.

$$\begin{array}{r} \text{71} \\ 876 \\ \hline 6132 \\ \hline 62196 \\ \hline \end{array}$$

$$\begin{array}{r} \text{111} \\ 146 \\ \hline 146 \\ \hline 16206 \\ \hline \end{array}$$

$$\begin{array}{r} \text{131} \\ 214 \\ \hline 642 \\ 214 \\ \hline 28034 \\ \hline \end{array}$$

Example 7. *Exam. 8.* *Exam. 9.*

Mul. 476 by 217. M. 349 by 143. M. 6760 by 6100.

$$\begin{array}{r} \text{217} \\ 476 \\ \hline 3332 \\ 952 \\ \hline 103292 \\ \hline \end{array}$$

$$\begin{array}{r} \text{143} \\ 349 \\ \hline 1047 \\ 1396 \\ \hline 49907 \\ \hline \end{array}$$

$$\begin{array}{r} \text{6100} \\ 6760 \\ \hline 4056 \\ \hline 41236000 \\ \hline \end{array}$$

CASE 2.

When the *Multiplier* is any Number between 12 & 20.

RULE.

Multiply every figure in the *Multiplicand* only by the Units figure in the *Multiplier*; adding to each Product (besides what you carry) the figure that stands at the right hand of that figure which you are *Multiplying*; when all the figures are *Multiplied*, add what you carry to the last figure.

Example 1. *Examp. 2.* *Examp. 3.*

Multiply 345 by 14. *Mult.* 7141 by 16. *Mult.* 603 by 18.

$$\begin{array}{r} 14 \\ \times 345 \\ \hline 4830 \\ \hline \end{array}$$

$$\begin{array}{r} 16 \\ \times 7141 \\ \hline 114256 \\ \hline \end{array}$$

$$\begin{array}{r} 18 \\ \times 603 \\ \hline 10854 \\ \hline \end{array}$$

Compare these three Examples with Examples 4th, 5th & 6th, in the 10th page, & with Examples 1st, 2d, and 3d, in the 14th page.

CASE 3.

When the *Multiplier* is above 20, and can be found in the Multiplication Table.

RULE.

Multiply by either of the 2 figures first, which produces the *Multiplier*, and that Product multiply by the other figure, and this last Product will be the answer.

Note, If there be any Cyphers at the right hand of such *Multipliers*, its only fixing them to the right hand of the last Product, as in Examples 4 & 5 following.

Exam-

Example 1.

What is the Product of
1416 Multiplied by 27?
9 & 3

$$\begin{array}{r} 12744 \\ 3 \\ \hline 38232 \end{array} \text{ Product.}$$

Example 2.

What is the Product of
4053 Multiplied by 63?
9 & 7

$$\begin{array}{r} 36477 \\ 7 \\ \hline 255339 \end{array} \text{ Product.}$$

Example 3.

Exam. 4.

Exam. 5.

Mul. 1614 by 84. M. 3416 by 560. M. 46711 by 7200.
12 & 7 8 & 7 9 & 8

$$\begin{array}{r} 19368 \\ 7 \\ \hline 135576 \end{array}$$

$$\begin{array}{r} 27328 \\ 7 \\ \hline 1912960 \end{array}$$

$$\begin{array}{r} 420399 \\ 8 \\ \hline 336319200 \end{array}$$

Compare these 5 Examples with Examples 7, 8, 9, 12, and 13, in pages 11, and 12.

CASE, 4.

When the Multiplier is a Unit, with any Number of Cyphers annex'd as 10, 100, 1000 &c.

R U L E.

Fix as many Cyphers at the right hand of the Multiplicand, as there are in the Multiplier.

Example 1.

Exam. 2.

Exam. 3.

Mul. 1601 by 10 Mul. 421 by 100. Mul. 3411 by 1000.

$$\begin{array}{r} 16010 \end{array}$$

$$\begin{array}{r} 42100 \end{array}$$

$$\begin{array}{r} 3411000 \end{array}$$

Sub.

SUBTRACTION

Of whole Numbers.

SUBTRACTION is the taking a lesser Number from a greater, whereby the Remainder, Difference, or Excess may be known, and is the reverse of Addition.

RULE.

Set the Units under the Units &c, as in Addition, but take care that the greater Number be uppermost; then begin at the right hand figure, and take or Subtract the lower figure from the upper, setting down the remainder; if the 2 figures chance to be equal, set down a Cypher; but if the upper figure be less than the lower, then call the upper figure 10 more than it is, and from that Sum Subtract the lower figure, the Remainder put down; then go to the next lower figure or Cypher, and because of the 10 which was borrow'd call it 1 more than it is, and Subtract as before, and so on till the operation be finished.

Example 1.

Example 2.

Pounds.

Gallons.

Lent my Friend 67

Borrow'd 346

Paid in part 27

Paid in part 129

Remains unpaid 40

Remains to pay 217

Exam-

Sub-

*Subtraction of**Example 3.*

A Lent to B 647 Pounds, and B has paid A in part 494 Pounds: how much remains for B to pay?

Pounds.

647

494

Answ. 153 Pounds.

Example 4.

Bought 71641 Yards of Cloth, and have sold 4570 Yards: how many Yards remain unfold?

Yards.

71641

4570

Answ. 67071 Yards.

Example 5.

Bought of Simon Easy 164121 Yards of Fustian and 6416 Yards, and have sold 47608 Yards: how many Yards remain unfold?

164121 } added together
6416 }

Bought in all 170537

Sold 47608

Remains unfold 122929

Proof 170537

} added for the Proof

Exam

Wko'e Numbers.

19

Example 6.

A in
ay? Borrow'd of Nicholas Sly 41671 Pounds, and paid him in part 3214 Pounds, and 168 Pounds, and 814 Pounds: what remains unpaid?

	<i>Pounds.</i>	<i>Pounds.</i>
Borrow'd.	41671	3214
Paid	4196	168
		814
Remains unpaid	37475	
Proof	41671	4196 Paid in all.

Note, When there are two or more Sums bought, or sold, borrow'd, or paid &c; such Sums must first be added together before you Subtract; as in the two last Examples.

Proof of Subtraction.

Proo Add the Remainder to the Sum Subtracted, and if it make the same Sum with that from which you did Subtract, the work is right.

Division

Proo

Exam



D I V I S I O N of

Whole Numbers.

DI V I S I O N is a concise or short method of Subtraction, and by this Rule we speedily discover how often one Number is contained in another, or how any Number may be divided into any Number of parts.

Observe, the Number which is to be divided, is call'd the Dividend; the Number by which it is divided, call'd the Divisor; and from the two Numbers will arise another Number, which shews how often the Divisor is contain'd in the Dividend, and is call'd the Quotient.

R U L E.

Begin to divide at the left hand, and see how many figures of the Dividend will contain the Divisor the largest number of times under 10, which figures call a Dividual, and place a prop under the last of them; then set down the number of times in the Quotient at the right hand, and Multiply the Divisor with it; the Product Subtract from the Dividual in the mind, and what remains set down, which never must be greater a Number as the Divisor; then prop under the next figure in the Dividend, and bring it down to the right hand of the remainder for a new Dividual, which divide as before; and so go on till all the figures of the Dividend are brought down and divided.

Note, There will be always as many figures in the Quotient as there are props under the Dividend.

Exam.

Whole Numbers.

21

Example 1.

Divide 2370 into 5 parts.

Divisor Dividend Quotient
5) 2370 (474 Answer

$$\begin{array}{r} \dots \\ \hline 37 \\ \hline 20 \\ \hline \end{array}$$

This Example explain'd.

$$\left\{ \begin{array}{l} 23 \\ 37 \\ 20 \end{array} \right\} \begin{array}{l} \text{Answer.} \\ \left\{ \begin{array}{l} 4 \\ 7 \\ 4 \end{array} \right\} \end{array} \begin{array}{l} \text{is} \\ \text{times} \end{array} \left\{ \begin{array}{l} 20 \\ 35 \\ 20 \end{array} \right\} \begin{array}{l} \text{from} \\ \text{and} \end{array} \left\{ \begin{array}{l} 23 \\ 37 \\ 20 \end{array} \right\} \begin{array}{l} \text{and} \\ \text{remains, to} \\ \text{which I bring} \\ \text{down} \end{array} \left\{ \begin{array}{l} 3 \\ 2 \\ 0 \end{array} \right\} \left\{ \begin{array}{l} 7 \\ 0 \end{array} \right\}$$

Example 2.

Divide 5096 into 3 parts.

$$\begin{array}{r} 3) 5096 (637 \\ \dots \\ \hline 29 \\ \hline 56 \\ \hline \end{array}$$

Example 3.

How many times is 12 contain'd in 7644?

$$12) 7644 (637$$

$$\begin{array}{r} \dots \\ \hline 44 \\ \hline 84 \\ \hline \end{array}$$

To

To find how often any Divisor is contain'd any Dividual, observe this

R U L E.

See how often the first figure to the left hand of the Divisor is contain'd in the first figure of the Dividual; if it will not be contain'd once, then see how often it will be contain'd in two of the first figures; the remainder if there be any must be join'd with the next figure of the Dividual, and see if that Sum will contain the first figure of the Divisor the same number of times; thus go on with the next figure of the Dividual and Divisor &c. And if you find you can have always the same number of times, you have the number of times the whole Divisor is contain'd in the Dividual; but if upon any of these tryals you find you cannot have always the same number of times, then try a less Figure.

When you have considered how often the Divisor is contain'd in the Dividual to know what remains when the Divisor is above 12, Multiply and Subtract in the mind thus:

First Multiply the Units figure in the Divisor by the Quotient figure; then Subtract the Product from the figure in the Dividual which is next your right hand, but if it cannot be Subtracted, then add so many Tens to the figure in the Dividual as that you may make Subtraction; the remainder set down, then Multiply the next figure in the Divisor with the Quotient figure, adding to the Product as many Units as you borrowed Tens; and Subtract that Sum out of the next figure in the Dividual, but if you cannot, then add a Sufficient Number of Tens as before, and thus go on with every figure in the Divisor.

Example 4.

How many times is 14 contain'd in 4830?

14) 4830 (345 *Ans*w.

...

$$\begin{array}{r} \text{---} \\ \cdot 63 \\ \text{---} \end{array}$$

$$\begin{array}{r} \text{---} \\ \cdot 70 \\ \text{---} \end{array}$$

..

This Example Explain'd.

How often 14 in 4830. *Ans*wer. { 48 } { 63 } { 70 }
 times 4 is { 3 } { 4 } { 5 }
 from { 12 } { 16 } { 20 }
 { 18 } { 23 } { 20 }
 and { 6 } { 7 } { 0 }
 remains, { 3 } { 4 } { 5 }
 times 1 & { 1 } { 2 } { 2 }
 Ten 1 { 1 } { 2 } { 2 }
 borrow'd is { 4 } { 6 } { 7 }
 from { 4 } { 6 } { 7 }
 And 0 remains.

Exam.

Example 5.

Divide 114256 by 16.

$$16 \overline{) 114256} \quad (7141$$

....

. 22

. 65

. 16

..

Example 6.

Divide 10854 by 18.

$$18 \overline{) 10854} \quad (603$$

...

. 54

..

Example 7.

What will the Quotient be,
if I divide 38232 by 27?

$$27 \overline{) 38232} \quad (1416 \text{ Answ.}$$

....

112

. 43

162

..

Example 8.

What will the Quotient be,
if I divide 255339 by 63?

$$63 \overline{) 255339} \quad (4053 \text{ Answ.}$$

....

. 333

189

..

Exam.

Example 9.

How often is 84 contain'd
in 135576?

Example 10.

How often is 245 contain'd
in 11306750?

18. 84)135576 (1614

245 (11306750 (46150 *Answ.*

$$\begin{array}{r} \text{---} \\ 515 \\ \text{---} \\ 117 \\ \text{---} \\ 336 \\ \text{---} \\ .. \end{array}$$

$$\begin{array}{r} \text{---} \\ 1506 \\ \text{---} \\ .367 \\ \text{---} \\ 1225 \\ \text{---} \\ ...0 \end{array}$$

The Ten last Examples are Proofs to Examples 1, 2, 3, 4, 5, 6, 7, 8, 9, and 14, in pages 10, 11 and 12.

Note. If there be a Cypher or Cyphers at the right hand of the Divisor; cut it or them off, and also as many figures or Cyphers at the right hand of the Dividend; then divide by the remaining figures, as if there had been no Cyphers, and those figures that are cut off from the Dividend bring down to the right hand of the last Remainder.

Example 11.

Answ. What will the Quotient be, if I divide 1912960 by 560?

Example 12.

what will the quotient be, if I divide 336319200 by 7200?

56)01912960(3416
.... *Answ.*

72)00336319200(46711
..... *Answ.*

$$\begin{array}{r} \text{---} \\ 232 \\ \text{---} \\ .89 \\ \text{---} \\ 336 \\ \text{---} \\ ...0 \end{array}$$

$$\begin{array}{r} \text{---} \\ 483 \\ \text{---} \\ 511 \\ \text{---} \\ .79 \\ \text{---} \\ .72 \\ \text{---} \\ . \end{array}$$

Exam-

Division of

Example 13.

What will the Quotient be, if I divide 110089750 by 30500?

$$305 \overline{) 110089750} \cdot 00 \quad \text{Anfw.}$$

$$\begin{array}{r} \text{-----} \\ 1858 \\ \text{-----} \\ .2897 \\ \text{-----} \\ 1525 \\ \text{-----} \\ \dots 000 \\ \text{-----} \end{array}$$

The three last Examples are Proofs to Examples 12, 13, and 15, in page 12.

Example 14.

Divide 116141714160 into 307200 parts.

$$3072 \overline{) 116141714160} \quad (\quad 378065$$

$$\begin{array}{r} \text{-----} \\ 23981 \\ \text{-----} \\ 24777 \\ \text{-----} \\ .20114 \\ \text{-----} \\ 16821 \\ \text{-----} \end{array} \quad \begin{array}{r} \text{-----} \\ 307200 \\ \text{-----} \\ 756130 \\ 2646455 \\ 1134195 \\ 146160 \\ \text{-----} \\ 116141714160 \\ \text{-----} \end{array}$$

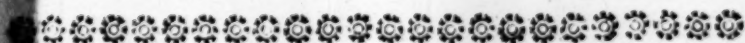
146160 Remainder.

Proof of Division.

As *Division* is the Proof of *Multiplication*, so consequently *Multiplication* must be the Proof of *Division*.

R U L E.

Multiply the *Quotient* by the *Divisor*; and if there be any remainder, it must be added in, as in the last Example.



A B B R E V I A T I O N S,

Or a short method of Dividing.

C A S E I.

WHEN the *Divisor* doth not exceed 12, or can be reduced to such by cutting off the Cyphers towards the right hand.

R U L E.

Ask how often the *Divisor* is contain'd in the first figure or figures in the *Dividend*, the answer set down under the *Dividend*, and what remains call so many Tens, which add to the next figure; then divide again as before, and so do till all the figures are divided.

Example 1.

Divide 2370 into 5 parts.

$$\begin{array}{r} 5 \overline{) 2370} \\ 474 \end{array}$$

474 Quotient.

Example 2.

Divide 5096 into 8 parts.

$$\begin{array}{r} 8 \overline{) 5096} \\ 637 \end{array}$$

637 Quotient.

Exam-

Example 3. Example 4.

How many times is 12
contain'd in 7644?

$$\begin{array}{r} 12 \overline{) 7644} \\ \underline{ 637} \\ \text{Answ.} \end{array}$$

What will the *Quotient* be,
if I divide 39849 by 20?

$$\begin{array}{r} 2 \overline{) 0} 3984 \overline{) 9} \\ \underline{ 1992} \\ \text{Answ.} \end{array} \quad \begin{array}{l} \text{Remainder} \\ 9 \\ \text{Divisor.} \\ 20 \end{array}$$

Compare Examples 1, 2, and 3, with Examples 1, 2, and 3, in page 21.

Note, If there be any remainder when Division is ended, place the Divisor under it, as in Example 4 above, which shews that the remainder 9 is to be divided by 20, but cannot be done without it first be reduced into a lower *Denomination*, which shall be shewn in *Division of different Denominations*.

Example 5.

Example 6.

What will the *Quotient* be,
if I divide 4836690 by 40?

$$\begin{array}{r} 4 \overline{) 0} 483669 \overline{) 0} \\ \underline{ 120917} \\ \text{Answ.} \end{array} \quad \frac{10}{40}$$

How often is 1200 contain'd
in 341614?

$$\begin{array}{r} 12 \overline{) 00} 3416 \overline{) 14} \\ \underline{ 284} \\ \text{Answ.} \end{array} \quad \begin{array}{l} 284 \\ 1200 \end{array} \quad \frac{284}{1200}$$

$$\text{Proof} \quad \begin{array}{r} 341614 \\ \underline{ 284} \end{array}$$

CASE 2.

When the Divisor is a Unit with any number of Cyphers annexed as 10, 100, 1000, &c.

RULE

R U L E.

Cut off so many figures or Cyphers towards the right hand of the Dividend, as there are Cyphers in the Divisor; then those figures which are at the left hand, are the *Quotient*, and those on the right hand the remainder.

Example 1.

Divide 1641 by 10.

$$10 \overline{) 1641}$$

Here 164 is the *Quotient*, and 1 remains.

*Example 2.**Example 3.*

Divide 6145 by 100. Divide 14141 by 1000.

$$100 \overline{) 6145}$$

2. Rem.

$$1000 \overline{) 14141}$$

2. Rem.

C A S E 3.

When the Divisor is above 12, and can be found in the Multiplication Table.

R U L E.

Divide by either of the two figures first, which produces the Divisor, and that Quotient divide by the other figure, and this last Quotient will be the answer.

Example

Example 1.

Example 2.

How many times is 14
contain'd in 4830?

$$\begin{array}{r} 14 \left\{ \begin{array}{l} 7) 4830 \\ 2) \underline{690} \\ \underline{345} \end{array} \right. \end{array}$$

Answ.

What will the Quotient be
I divide 114256 by 16

$$\begin{array}{r} 16 \left\{ \begin{array}{l} 4) 114256 \\ 4) \underline{28564} \\ \underline{7141} \end{array} \right. \end{array}$$

Answ.

Example 3.

Example 4.

What will the Quotient be,
if I divide 10854 by 18?

$$\begin{array}{r} 6) 10854 \\ \underline{1809} \\ \underline{603} \end{array}$$

Answ.

What will the Quotient
if I divide 38232 by 3?

$$\begin{array}{r} 3) 38232 \\ \underline{12744} \\ \underline{1416} \end{array}$$

Answ.

Example 5.

Example 6.

How often is 63 contain'd
in 255339?

$$\begin{array}{r} 7) 255339 \\ \underline{36477} \\ \underline{4053} \end{array}$$

Answ.

How often is 84 contain'd
in 135576?

$$\begin{array}{r} 7) 135576 \\ \underline{19368} \\ \underline{1614} \end{array}$$

Ex

Example 7.

Example 8.

What will the Quotient be, if I divide 1912960 by 560? | What will the Quotient be, if I divide 336319200 by 7200?

$$56 \overline{) 1912960}$$

$$8 \overline{) 336319200}$$

$$9 \overline{) 420399}$$

3416 Quotient. 46711 Quotient.

Compare Examples 1, 2, 3, 4, 5, 6, 7, and 8, last, with Examples 4, 5, 6, 7, 8, 9, 11, and 12, in pages 23, 24, and 25.

Note, in these Questions there being two Divisors, consequently there may be two Remainders; but the true Remainder is thus found.

R U L E.

Multiply the first Divisor by the last Remainder, and to that Sum add the first Remainder.

Example 9.

Example 10.

Divide 614161 by 81.

Divide 1416147 by 108.

$$9 \overline{) 614161}$$

$$9 \overline{) 1416147}$$

$$9 \overline{) 68240-1} \left. \begin{array}{l} 7582-2 \end{array} \right\} \begin{array}{l} 19 \text{ True Rem.} \\ 81 \text{ Divisor.} \end{array}$$

$$12 \overline{) 157349-6} \left. \begin{array}{l} 13112-5 \end{array} \right\} \begin{array}{l} 51 \\ 108 \end{array}$$

Exam.

*Division.**Example 11.*

What will the Quotient be, if I divide 4160014
14400?

$$\begin{array}{r}
 144 \overline{) 4160014} \\
 \underline{12) 41600 \mid 14} \\
 \underline{12) 3466 \cdot -8} \\
 \text{Quotient } 288 \cdot -10 \left. \vphantom{\begin{array}{l} 12) 41600 \mid 14 \\ 12) 3466 \cdot -8 \end{array}} \right\} \begin{array}{l} 128 \text{ and } 14 \text{ annex'd which} \\ \text{is cut off, makes } 128 \\ \text{the true Remainder.} \end{array} \\
 \underline{12} \\
 3456 \\
 \underline{1200} \\
 \text{Proof } 4160014
 \end{array}$$

Observe when you prove any Questions of this nature that you take in the true Remainder, when you Multiply for the last Product, as in the last Example.

TABLES

Tables of Money, Weights, and Measures.

Of MONEY.

$\left. \begin{array}{l} 5 \\ 6 \\ 13 \\ 16 \\ 21 \\ 27 \\ 72 \end{array} \right\} \text{Shillings}$	and $\left\{ \begin{array}{l} 8 \\ 4 \\ 6 \end{array} \right\} \text{Pence}$	make 1	$\left\{ \begin{array}{l} \text{Crown,} \\ \text{Noble,} \\ \text{Mark,} \\ \text{Pistole,} \\ \text{Guinea,} \\ \text{Moidore,} \\ \text{Johannes.} \end{array} \right.$
Pounds Shillings. Or 3 : 12.			

Note, That two Nobles make a Mark, three Nobles make one Pound, and three Marks make two Pounds.

But our Accompts are kept in *Pounds, Shillings, Pence,* and *Farthings,* and are thus divided.

$\left\{ \begin{array}{l} 4 \text{ Farthings} \\ 12 \text{ Pence} \\ 20 \text{ Shillings} \end{array} \right\}$	make 1	$\left\{ \begin{array}{l} \text{Penny,} \\ \text{Shilling,} \\ \text{Pound.} \end{array} \right.$
---	---------------	---

mark'd thus: *q. or f.* *d.* *s.* *l.*
Farthings, Pence, Shillings, Pounds.

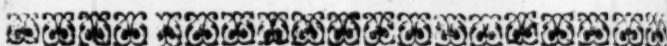
The Farthings are commonly set down thus,

$\left\{ \begin{array}{l} \text{one Farthing} \\ \text{an half-penny} \\ 3 \text{ Farthings} \end{array} \right\}$	Or the	$\left\{ \begin{array}{l} \text{Quarter} \\ \text{Half} \\ 3 \text{ Quarters} \end{array} \right\}$	of any thing.
--	---------------	---	----------------------

But throughout this Treatise, I shall set them down in all other Denominations.

D

Troy



TROY WEIGHT.

24 Grains	} make 1	{ Penny-weight,	
20 Penny-wt.			Ounce,
12 Ounces			Pound.

mark'd thus: *gr.* *pw.* *oz.*
 Grains, Penny-wt. Ounces, Pound

By which are weigh'd Jewels, Gold, Silver, Bread, and all Liquors.

APOTHECARIES WEIGHT.

The Apothecaries divide a *lb.* Troy as in this

20 Grains	} make 1	{ Scruple,	
3 Scruples			Dram,
8 Drains			Ounce,
12 Ounces.			Pound.

mark'd thus: *gr.* 20 3 8 12
 Grains, Scruples, Drains, Ounces, Pound

By which Apothecaries compound their Medicines but they buy and sell their Drugs by Avoirdupois

AVOIRDUPOIS WEIGHT.

16 Drains	} make 1	{ Ounce,	
16 Ounces			Pound,
28 Pounds			Quarter of a Hundred,
4 Quarters or 112			Tun.

mark'd thus: *dr.* *oz.* *lb.* 28 4 20
 Drains, Ounces, Pounds, Quarters of a Hundred, Hundreds

Note, 112 *lb.* make half a *C.* and 84 *lb.* make Quarters of a *C.*

One Pound Avoirdupois is equal to 14 oz.
15 gr. and a half Troy.

Avoirdupois WEIGHT are weigh'd all Com-
modities which are Course, or Drossy, or subject to
Waste, as Tobacco, Sugar, Fruit, Drugs, Pitch,
Tar, Wax, Flax, Tallow, Hemp, Copper, Tin,
Steel, Iron, Brass, Lead, Flesh, Butter, Cheese, Salt,
and all kind of Grocery Wares, &c.

Wool is also weigh'd by Avoirdupois WEIGHT, but
differently divided, as in the following Table.

W O O L L W E I G H T .

7	Pounds	}	make 1	{	Clove,
2	Cloves				Stone,
2	Stones				Tod,
6	Todds & 1 Stone				Wey,
2	Ways				Sack,
12	Sacks				Last.

L E A D W E I G H T .

C. 2.

19 : 2 make a Fodder.

Of



CLOTH MEASURE.

4 Nails } make 1 { Quarter,
4 Quarters } Yard.

mark'd thus: N. Q. Yd.
 Nails, Quarters, Yards.

Note, An Ell Flemish is three Quarters of a Yd.
an Ell English is five Quarters.

LONG MEASURE.

3 Barley-Corns	} make 1	{	Inch,
12 Inches			Foot,
3 Feet			Yard,
5 Yards & 2 Quarters			Pole or Perch,
40 Poles or Perches			Furlong,
8 Furlongs or 1760 yd.			Mile,
3 Miles			League,
20 Leagues			Degree.

WINE MEASURE.

Pints Quarts Gallons Hogsheads Pipes or Butts	Quart, Gallon, Hogshead, Pipe or Butt, Tun.
--	---

make 1

marked thus : pt. qrt. gal. bd. P.
Pints, Quarts, Gallons, Hogsheads, Pipes.

Note, 18 Gallons make a Rundlet.

BEER and ALE MEASURE.

Pints Quarts Gallons Firkins Kilderkins Barrels	Quart, Gallon, Firkin of { Kilderkin, Barrel, Butt.
---	--

Ale, Soap, or Herrings.
Beer.

Note, That in all other Places besides London,
a Firkin of Beer and Ale contains Eight Gallons
and half.

Dry

D R Y MEASURE.

By this are MEASURED, all sorts of Grain,
Sea-Coal, &c.

1 lb. Troy	} make 1	Pint,	} Corn Wale
2 Pints		Quart,	
2 Quarts		Pottle,	
2 Pottles		Gallon,	
2 Gallons		Peck,	
4 } Pecks		Busshel of	
5 }		Coomb,	
4 Busshels		Quarter,	
2 Coombs		Chalder,	
4 } Quarters		Wey,	
5 }		Last.	
2 Weys			

Of DOZENS.

12 { Pieces or Things	} make 1	{ Dozen,	}
{ Dozen		Small	
{ Small Groſs		Great	

Of TIME.

60 Minutes	} make 1	{ Hour	}
24 Hours		Day,	
7 Days		Week	
4 Weeks		Month	
13 Months, one Day & 6 Hours		Year	

Redu

REDUCTION.

REDUCTION teacheth to reduce or bring Numbers of one *Denomination* or Name, into numbers of another, or different Names into one name, without the least Alteration of Value.

CASE I.

This Case shews how to reduce a higher *Denomination* to a lower, and is done by *Multiplication*.

RULE.

Multiply the higher *Denomination* by as many of the lower as will make one of the higher.

Or, by the same Rule, first reduce it into the next lower *Denomination*, and so go on, till you have reduced it into the *Denomination* required.

Example I.

In 67 *l.* how many Nobles?
3 Nobles in 1 *l.*

201 *Answ.*

Example

Example 2.

In 471 *l.* how many Two-shillings's?

$$\begin{array}{r} 10 \\ \hline 4710 \end{array} \text{ Answ.}$$

Or you may Multiply any Number by 10, by fixing a Cypher to the right hand as in page 16.

Reduce 471 *l.* into Two-shillings's, by fixing a Cypher thus,

Answ. 4710 Two-shillings's as before.

Note, I shall mark Two-shillings's with *ss.* Two-pences with *dd.*

Observe, if the Numbers to be reduced are of different *Denominations*; as you reduce the higher into the lower add to the Product as you Multiply, as many as there are of that lower.

Example 3.

In $\begin{array}{cc} \textit{l.} & \textit{s.} \\ 471 & : 16 \end{array}$ how many Two-shillings's?
10 *ss.* in 1 *l.* and take in 8 *ss.*

Answ. 4718 *ss.*

Or thus, fix half the number of Shillings to the right hand of the Pounds; and you have Pounds and Shillings reduced into Two-shillings's:

Example above.

Reduce $\begin{array}{cc} \textit{l.} & \textit{s.} \\ 471 & : 16 \end{array}$ into Two-shillings's,

Answ. 4718 *ss.* as before; and so of any other

No

Note, Any number of Two-shillings's may be reduced

into $\left\{ \begin{array}{c} d \\ 8 \\ 6 \\ 4 \\ 3 \\ 2 \end{array} \right\}$ pieces of $\left\{ \begin{array}{c} \text{by Multi-} \\ \text{plying by} \end{array} \right\} \left\{ \begin{array}{c} 3 \\ 4 \\ 6 \\ 8 \\ 12 \end{array} \right\}$ because $\left\{ \begin{array}{c} 3 \text{ Eight-} \\ 4 \text{ Six-} \\ 6 \text{ Four-} \\ 8 \text{ Three-} \\ 12 \text{ Two-} \end{array} \right\}$ pences make 2 shillings.

Example 4.

In $\begin{array}{c} l. \\ 46 : \end{array} \begin{array}{c} s. \\ 14, \end{array}$ how many Eight-pences?

467 ss

3

1401 *Answ.*

Example 5.

In $\begin{array}{c} l. \\ 36, \end{array}$ how many Three-pences?

360 ss.

8

Answ. 2880 Three-pences.

Example 6.

In $\begin{array}{c} l. \\ 14 : \end{array} \begin{array}{c} s. \\ 16 : \end{array} \begin{array}{c} d. \\ 6, \end{array}$ how many Six-pences?

148 ss.

4 Multiply and take in one 6 d.

Answ. 593

Exam-

Example 7.

l. s. d.
In 43 : 15 : 4, how many Groats?

437 ss. in 43 *l.* 14 *s.* *d.*
6 and four Groats in 1 : 4 took in.

Answ. 2626

Example 8.

l.
In 471, how many Farthings?

4710 ss.
12 dd. in 1 ss.

56520 dd.
8 f. in 1 dd.

452160 f. *Answ.*

Common way.

Reduce 471 *l.* into Farthings
20 *s.* in 1 *l.*

9420 *s.*
12 *d.* in 1 *s.*

113040 *d.*
4 f. in 1 *d.*

Answ. 452160 f. as before.

Example 9.

l. s. d. f.
In 31 : 15 : 7 : 1 how many Farthings?

317 ss. in 31 *l.* 14 *s.*
12 and 9 dd. took in.

3813 dd.
8 and 5 f. took in.

30509 f. *Answ.*

Common way.

l. s. d. f.
31 : 15 : 7 : 1 into Farthings
20 *s.* in 1 *l.*

635 *s.*
12 *d.* in 1 *s.*

7627 *d.*
4 f. in 1 *d.*

Answ. 30509 f. as before.

Example 10.

l. s. d.
In 47:17:7, how many Pence? Or thus,

478 ss.

2 and 1 s. took in.

957 s.

12 d. in 1 s. & 7d took in.

11491 d. *Answ.**Answ.* 11491 d. as before.*l. s. d.*

47:17:7 into Pence.

205.1 in l. & 17 s. took

(in.

957

12 d. in 1 s. & 7d. took

(in.

Example 11.

In 49 Guineas, how many Farthings?

~~21~~ s. in 1 Guinea.

98

1029 s.

12 d. in 1 s.

12348 d.

4 f. in 1 d.

Answ. 49392 f.

Example 12.

s. d. f.
How many Farthings are there in 14:6:2?

12

174 d.

1014

Answ. 698 f.

Troy



TROY WEIGHT.

Example 1.

lb.
In 16 of Silver, how many *oz. pw.* and *gr.*
12 *oz.* in 1 *lb.*

192 *oz.*
20 *pw.* in 1 *oz.*

3840 *pw.*
6
—
23040 } 24 *gr.* in 1 *pw.*
4
—
92160 *gr.*

Example 2.

How many Grains are there in a Silver Tankard,
which weighs 2 *lb.* 10 *oz.* 4 *pw.*?

12 Multiply and take in the 10 *oz.*

34 *oz.*
20 and take in 4 *pw.*

684 *pw.*
6 and 4

4104
4

Ans. 16416 *gr.*

Avoir du poid

VOIR DUPOIS WEIGHT.

Example 1.

and gr
 lb.
 Reduce 14 into oz. and dr.
 16 oz. in 1 lb.

224 oz.
 16 dr. in 1 oz.

3584 dr.

Example 2.

Tankard
 oz.
 C.
 Reduce 41 into lb.
 4 Q. in 1 C.

164 Q.
 7
 1148 } 28 lb. in 1 Q.
 4

Ans. 4592 lb.

Or Cwt^s. may speedily be reduced into lb, by setting them down four several times, thus; set twice Units under Units, &c. And the other twice each time a figure nearer the left hand; then add the four lines together, and you have the Answer.

Notes

Note, If there be any *Q.* and *lb.* they must be down and added in with the four lines.

The last Example work'd thus :

$$\begin{array}{r}
 C. \\
 41 \\
 41 \\
 41 \\
 41 \\
 \hline
 4592 \text{ lb. as before.} \\
 \hline
 \end{array}$$

The reason of this may easily be seen by Multiplying the *Cwts.* by the *lb.* contain'd in 1 *Cwt.* thus :

$$\begin{array}{r}
 C. \\
 41 \\
 112 \\
 \hline
 82 \\
 41 \\
 41 \\
 \hline
 4592 \text{ lb. as before.} \\
 \hline
 \end{array}$$

Example

Example 3.

C. 2. lb.

In 35 : 3 : 20. of Sugar, how many lb?

$$\begin{array}{r} 4 \\ \hline 143 \text{ 2.} \\ 7 \text{ and } 4 \end{array}$$

1001

$$\begin{array}{r} 4 \\ \hline \end{array}$$

4024 lb. *Ans.*

Observe, when I multiplied by 7 and 4 for 28, I took in the 20 lb. when I multiplied by the latter figure; observe the same in the like Cases.

Or thus,

C. 2. lb.

35 : 3 : 20

35

35

35

84 lb. or 3 2.

20 lb.

4024 as before.

Example 4.

T. C. 2. lb. oz. dr.

How many Drams are there in 4 : 3 : 2 : 17 : 3 : 14?

20

83 C.

83

83

83

56 lb. or 2 2.

17 lb.

9369 lb.

16

149907 oz.

16

Ans. 2398526 dr.

Cloth



CLOTH MEASURE.

Example 1.

In 141 Yards, how many Nails?
16

Answ. 2256 Nails.

Example 2.

In 16 Ells English, how many Nails?
20

Answ. 320 Nails.

Example 3.

Yd. 2. *N.*

In 225 : 3 : 2, how many Nails?
4

903 2.
4

Answ. 3614 N.

Or thus,

Yd. 2. *N.*

225 : 3 : 2

16 N in 1 yd & take in 14, 504

3614 N. as before.

Exam

Example 4.

E. In 47 Pieces of Cloth, each containing 25 Yards,
how many Nails?

47 Pieces.

$$\begin{array}{r} 5 \\ \hline 235 \end{array} \left. \vphantom{\begin{array}{r} 5 \\ \hline 235 \end{array}} \right\} 25 \text{ Yds. in } 1 \text{ P.}$$

$$\begin{array}{r} 1175 \text{ Yds.} \\ 16 \\ \hline \end{array}$$

Ans. 18800 Nails.

*WINE MEASURE.**Example 1.*

14 Tuns, how many Pipes, *hd.* gal. *qrt.* and *pt.*?
P. in 1 Tun.

28 P.

2 *hd.* in 1 Pipe.

56 *hd.*

9

Take in 14 Tuns } 63 gal. in 1 *hd.*

512 gal.

Example 2 *qrt.*

2

128 *pt.*

5

Example

How many Quarts are there in $5 : 1 : 4$ Tun. *hd.*
 $4 \text{ } hd.$ in

$21 \text{ } hd.$

$\begin{array}{r} 7 \\ 147 \\ 9 \end{array} \left. \vphantom{\begin{array}{r} 7 \\ 147 \\ 9 \end{array}} \right\} 63$

1372 gal.

4

Ans. 5488 qrt.



LONG MEASURE.

If the Circumference of this Terraqueous Globe be 360 Degrees, how many Barley-Corns will reach the same?

360 Degrees.

60 Miles in 1 Degree.

21600 Miles.

Multiply by 1760 Yards in 1 Mile.

1296

1512

38016000 Yards.

3

114048000 Feet.

12

1368576000 Inches.

3

4105728000 Barley-Corns.

Of TIME.

Example 1.

Example 2.

How many Weeks, Days,
Hours are there in one

In 17 Years, how many
Months, and Weeks ?

Months, W. D. H.
3 : — : 1 : 6 in 1 Yr.

17

13

221 Months.

4

834 Weeks.

2 Weeks.

Days.

6 Hours in 1 Year.

Example 3.

How many Minutes are expired since the Birth
our Saviour to this present Year 1737 ?

8766 Hours in 1 Year.

~~1737~~

61362

26298

61362

15226542 Hours.

60

Ans. 913592520 Minutes.

The

The Examples in this Case may be proved by the Multipliers into Divisors; by which Divisors Answers to the Examples, beginning with that first, which is the last Multiplier, &c. In the Case I shall give some Examples.

C A S E. 2.

This Case shews how to Reduce a lower Denomination into a higher, and is done by Division.

R U L E.

Divide the lower Denomination by as many of the lower as will make one of the higher.

Or, by the same Rule, first Reduce it into the higher, and so on, till you have reduced it into the Denomination required.

Note, If there be any Remainder in Reducing, it will be always of the same Denomination with the Number which was to be reduced.

Observe, the following Pieces of Money are reduced into Pounds thus;

Pieces of	$s.$	$d.$	By dividing as per Rule, by
	10	—	
	6	8	
	5	—	
	4	—	
	3	4	
	2	6	
	2	—	

Example 1.

In 371 Nobles, or Pieces of 6 s. 8d. how many Pounds?

3)371

123 l. and 2 N. or 13 s. 4 d. *Ans.*

Ex

Example 2.

In 317 Crowns, how many Pounds?

$4 \overline{) 317}$

Ans. 79 l. and 1 C. or 5 s.

Example 3.

s. d.

In 681 Pieces of 3 : 4, how many Pounds?

$6 \overline{) 681}$

s. d. s.

Ans. 113 l. and three 3 : 4 or 10.

Example 4.

In 4718 Pieces of 2 s. how many Pounds?

ss. $10 \overline{) 4718}$ ss.

Ans. 471 l. and 8 ss. or 16 s.

Or thus; as dividing by 10 in Page 29, is only cutting off the Units place; therefore any Number of Two-Shillings's may be reduced into Pounds at sight, by cutting off the Units place with a prop; then the Figure or figures on the left hand are Pounds, and that which is cut off being doubled gives Shillings; as for instance the above Example.

471.8 ss. reduced into Pounds at sight.

Ans. 471 l. 16 s. as before.

Therefore

Therefore if any Pieces of Money which are an even part of Two-Shillings (such as Pieces of 12 d. 8 d. 6 d. 4 d. 3 d. 2 d.) are to be reduced into Pounds, it is only reducing them into Two-shillings's, and you have the Answer in Pounds at sight.

Example 5.

In 1401 Pieces of 8 d. how many Pounds?
8-pences 3)1401 Eight-pences.

46.7 ss. or 46 l. 14 s. at sight.

Example 6.

In 2880 Three-pences, how many Pounds?
3-pences 8)2880

Ans. 36.0 ss.

Example 7.

In 593 Six-pences, how many Pounds?
6-pences 4)593

Ans. 14.8 ss. —s. 6 d.

Example 8.

In 2626 Groats, how many Pounds?
Groats 6) 2626

Ans. 43.7 ss. 1 s. 4 d.

Note,

e an even
8 d. 6
it is only
have the

Note, When you have doubled the figure cut off the Two-shillings's, if there be an odd shilling, reckon it in; then the Answer to the last Example is 43 l. 15 s. 4 d.

The Examples 4, 5, 6, 7, and 8, are Proofs to Examples 3, 4, 5, 6, and 7, in Pages 40, 41, and 42.

unds ?

Observe, if the Money to be reduced into Pounds be an even part of any of those even parts of Two-shillings mention'd in p. 54, as Pieces of 1 f. 2 f. 3 f. 1 d. or 1 d. 2 f. first reduce them into some of those even parts of Two-shillings which will be the most convenient, then into Two-shillings's for the Answer.

unds ?

Note, I shall reduce Pieces of 1 f. or 2 f. first into Two-pences, Pieces of 3 f. into Three-pences, and Pieces of 1 d. or 1 d. 2 f. into Shillings, and so on.

Example 9, and Proof to Example 9 in page 42.

In 30509 Farthings, how many Pounds ?

f. 8) 30509 f.

Common way.

4) 30509 f.

dd. 12) 3813 dd. 5 f.

Ans. 31.7 s. 1 s. 7 d. 1 f. | 12) 7627 d. 1 f.

2) 0) 63 | 5 s. 7 d.

31 l. 15 s. 7 d. 1 f.

In the first operation in dividing by 12 there remain'd 9 d. which added to the 5 f. that remain'd in dividing by 8 makes the odd 1 s. 7 d. 1 f. observe the same in the like Cases.

Note,

Example

Example 10.

In 4714 Pieces of Three-farthings, how many Pounds?

$$\begin{array}{r} 4) 4714 \\ \hline \end{array}$$

$$\begin{array}{r} 8) 1178 \text{ Three-pences: } 6 f. \\ \hline \end{array}$$

14.7 ss. -- s. 7 d. 2 f. *Answ.*

Example 11, and Proof to Example 10 in page 43.

In 11491 Pence, how many Pounds?

$$\begin{array}{r} 12) 11491 d. \\ \hline \end{array}$$

$$\begin{array}{r} 2) 957 s. 7 d. \\ \hline \end{array}$$

Answ. 47.8 ss. 1 s. 7 d.

Example 12.

In 497 Pieces of 1 d. 2 f. how many Pounds?

$$\begin{array}{r} 8) 497 \text{ Three-half-pences.} \\ \hline \end{array}$$

$$\begin{array}{r} 2) 62 s. 1 d. 2 f. \\ \hline \end{array}$$

Answ. 3.1 ss. -- s. 1 d. 2 f.

Pounds. **TROY WEIGHT.**

Example 1, and Proof to Example 2 in page 44.

How many Pounds are there in a Silver Tankard, which weighs 16416 Grains?

page 43.

$$\text{gr. 24} \left\{ \begin{array}{l} 4) 16416 \text{ gr.} \\ 6) 4104 \end{array} \right.$$

$$\text{pw. } 2|0) 68|4 \text{ pw.}$$

$$\text{oz. 12) 34 oz. 4 pw.}$$

Ans. 2 lb. 10 oz. 4 pw.

unds? **VOIRDUPOIS WEIGHT.**

Example 1.

In 4024 lb. how many C. wt.?

4) 4024 lb.		Or thus,
7) 1006 : 0	} 20 lb.	lb. lb. C.
4) 143 2.5		112) 4024 (35
		.664
fw. 35 C. 3 2. 20 lb.	Rem.	2 lb. 104 lb. or 3 : 20

F

Example

Example 2.

In 2398526 Drams, how many Tun

$$\begin{array}{r} \text{dr. } \left\{ \begin{array}{l} 4) \ 2398526 \ \text{dr.} \\ \hline 4) \ 599631 : 2 \end{array} \right. \left. \begin{array}{l} \\ \end{array} \right\} \begin{array}{l} \\ \text{dr.} \end{array} \\ 16 \end{array}$$

$$\begin{array}{r} \text{oz. } \left\{ \begin{array}{l} 4) \ 149907 \ \text{oz.} \ 3 \\ \hline 4) \ 37476 : 3 \end{array} \right. \left. \begin{array}{l} \\ \end{array} \right\} \begin{array}{l} \\ \text{oz.} \end{array} \\ 16 \end{array}$$

$$\begin{array}{r} \text{lb. } \left\{ \begin{array}{l} 7) \ 9369 \ \text{lb.} \ 0 \\ \hline 4) \ 1338 : 3 \end{array} \right. \left. \begin{array}{l} \\ \end{array} \right\} \begin{array}{l} \\ \text{lb.} \end{array} \\ 28 \end{array}$$

$$\begin{array}{r} \text{Q. } 4) \ 334 \ \text{Q.} \ 2 \end{array}$$

$$\text{C. } 2|0) \ 8|3 \ \text{C. } 2 \ \text{Q.}$$

Answ. 4 T. 3 C. 2 Q. 17 lb. 3 oz.

The 2 last Exam. are Proofs to Exam. 3, and 4 in page



CLOTH MEASURE.

Example 1.

In 2256 Nails,
how many Yards?

$$\text{N. } 4) \ 2256 \ \text{N.}$$

$$\text{Q. } 4) \ 564 \ \text{Q.}$$

$$\text{Answ. } \underline{\underline{141 \ \text{Yd.}}}$$

Example 2.

In 320 Nails,
many Ells English

$$\text{N. } 2|0) \ 32|0$$

$$\text{Answ. } \underline{\underline{16 \ \text{Ells}}}$$

Ex

Example 3.

How many Yards are there in 3614 Nails?

$$N. 4) \underline{3614} N.$$

$$Q. 4) \underline{903} Q. 2 N.$$

$$Answ. 225 Yd. 3 Q. 2 N.$$

Example 4.

How many Pieces are there in 18800 Nails of
oth, each Ps. qt. 25 Yards?

$$N. 4) \underline{18800} N.$$

$$Q. 4) \underline{4700} Q.$$

$$Yd. 25 \left\{ \begin{array}{l} 5) \underline{1175} Yd. \\ 5) \underline{235} \end{array} \right.$$

$$Answ. 47 Pieces.$$

These four Examples are Proofs to Examples 1,
3, and 4 in pages 48, and 49.

J R E.

Example 2.

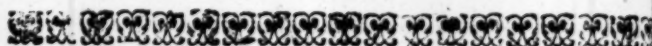
o Nails,
ls English

10) 3210

sw. 16 E

Ex

WINE



WINE MEASURE.

*Example.**This Example is Proof to Example 2 page*

In 5488 Quarts, how many Tuns ?

$$\begin{array}{r}
 \text{qrt. } 4) \ 5488 \text{ qrt.} \\
 \hline
 \text{gal. } 63 \left\{ \begin{array}{l} 9) \ 1372 \text{ gal.} \\ \hline 7) \ 152 : 4 \\ \hline \text{bd. } 4) \ 21 \text{ bd. } 5 \end{array} \right\} 49 \text{ gal.} \\
 \hline
 \text{Ans. } 5 \text{ T. } 1 \text{ bd. } 49 \text{ gal.}
 \end{array}$$

C A S E 3.

In Cases 1, and 2 was shewn how to reduce a higher Denomination into a lower, and the converse when some number of the lower Denomination is contained in one of the higher ; but it may happen that the lower Denomination cannot be exactly contained some number of times in one of the higher ; then work by the Rule following.

R U L E.

Reduce the Denomination given into such a Denomination, as may the readiest be reduced into the Denomination required ; then that Product reduce into the Denomination required by the last Case.

R E.

Of MONEY.

Example 1.

What will 72 Pieces of Five-Farthings come to?
 $5 f.$

$$\begin{array}{r} 4) 360 f. \\ \hline \end{array}$$

Ans. $90 d.$ or $7 s. 6 d.$

Example 2.

In 312 Pieces of 7 Farthings, how many Pounds?
 $7 f.$

$$\begin{array}{r} 8) 2184 f. \\ \hline \end{array}$$

$$\begin{array}{r} 12) 273 dd. \\ \hline \end{array}$$

Ans. $2.2 ss. 1 s. 6 d.$

Example 3.

$d. f.$

In 407 Pieces of $2 : 2$, how many Pounds?
 $f.$

such a De 4070 here I fixed a Cypher instead of multiplying
 into the by 10 f. which are in $2 d. 2 f.$

$$\begin{array}{r} 12) 508 dd. 6 f. \\ \hline \end{array}$$

Ans. $4.2 ss. - s. 9 d. 2 f.$

Example

Example 4.

Example 5.

In 164 Pieces of $d. f.$ 7:1;
how many Pounds? 4

164
29 $f.$

1476
328

8) 4756 $f.$

12) 594 $dd. 4 f.$

Ans. 4.9 ss. 1 s. 1 d.

In 428 Pieces of 11:
how many Pounds? 4

428
9 $f.$

3852
5 } 45 $f.$

8) 19260 $f.$

12) 2407 $dd. 4 f.$

Ans. 20.0 ss. 1 s. 3 d.

Example 6.

In 427 Pieces of 13 $d.$ how many Pounds?
13 $d.$

12) 5551 $d.$

2) 462 s. 7 $d.$

Ans. 23.1 ss. — s. 7 $d.$

Example 7.

How many Pounds are there in 471 Pieces of
17 $d. 2 f.$

4
70 $f.$

8) 32970 $f.$

12) 4121 $dd. 2 f.$

Ans. 34.3 ss. — s. 10 $d.$

Reduction.

63

Example 8.

How many Pounds are there in 216 Pieces of

22 d. 3f.

91f.

1944

8) 19656 f.

12) 2457 dd.

Ans. 20.4 ss. 1 s. 6 d.

The following Pieces of Money are reduced into Pounds thus :

Pence,

Pence,

{ 9 }
{ 10 }
{ 14 }
{ 15 }
{ 16 }
{ 18 }
{ 20 }
{ 21 }
{ 22 }

{ 3 }
{ 2 }
{ 2 }
{ 3 }
{ 8 }
{ 6 }
{ 2 }
{ 3 }
{ 2 }

are first reduced into Pieces of

then into two-shillings's &c.

Example 9.

How many Pounds are there in 145 Pieces of 15 ? d. 5 Three-pences in 15.

8) 725 Three-pences.

Ans. 9.0 ss. 1 s. 3 d.

Exam,

Example 10.

d.

In 141 Pieces of 20, how many Pounds?

12) 1410 *dd.* here I fixed a Cypher, which brings

<i>Answ.</i> 11.7 ss. 1 s.	them into Two-pences, instead multiplying by 10 <i>dd.</i> which in 20 d.
----------------------------	---

Example 11.

s. d.

In 49 Pieces of 4 : 8, how many Pounds?

7 Eight-pences in 4 s. 8 d.

3) 343 Eight-pences.

Answ. 11.4 ss.— s. 8 d.

Example 12.

s. d.

In 157 Pieces of 8 : 3, how many Pounds?

$\begin{array}{r} 11 \\ \hline 1727 \\ 3 \end{array}$	}	33	$\begin{array}{r} 4 \\ \hline 33 \end{array}$	Three-pences.
---	---	----	---	---------------

8) 5181 Three-pences.

Answ. 64.7 ss. 1 s. 3 d.

Example

Example 13.

s. d.
 14 : 10, how many Pounds?
 6

$$\begin{array}{r} 89 \text{ dd.} \\ \hline 7 \\ \hline 623 \end{array} \left. \vphantom{\begin{array}{r} 89 \\ 7 \\ 623 \end{array}} \right\} 56 \text{ Ps.}$$

$$\begin{array}{r} 12 \overline{) 4984} \text{ dd.} \\ \hline \end{array}$$

Answ. 41.5 ss. — s. 8 d.

Example 14.

14 Pieces of 17 s. how many Pounds?

17 s.

$$\begin{array}{r} 10438 \text{ s.} \\ \hline \end{array}$$

$$\begin{array}{r} 5219 \text{ ss.} \\ \hline \end{array}$$

G

Example

Example

Example 15.

l. s. d.
In 73 Pieces of 2 : 9 : 4, how many Po

24 ss.

6, and 4 Groats taken in.

148 G.

73 Pieces.

444

1036

6) 10804 Groats.

Anfw. 180.0 ss. 1 s. 4 d.

Example 16.

l. s. d.
In 666 Pieces of 3 : 15 : 9, how many

303

37 ss.

8, and 7 Three-pences

1998

1998

303 Three-pences.

8) 201798 Three-pences.

2522.4 ss. 1 s. 6 d. *Anfw.*

Example 17.

How many Pounds are there in 82 Pieces of
7 l. 14 s. 4 d. ?

77 ss.

6, and 1 Groat taken in.

463 Groats.

82 Ps.

926

3704

6) 37066 G.

Ans. 632.7 ss. 1 s. 4 d.

Example 18.

In 147 l. how many Guineas ?
20 s. in 1 l.

3) 2940 s.

7) 980

Ans. 140 Guineas.

Example

Example 19, and Proof to the last

In 140 Guineas, how many Pounds?

21 s. in 1 Guinea.

140 Guineas.

 s. 2) 2940 s.

Answ. 147.0 ss.*Example 20.*

In 127 Pounds, how many

3 Nobles in 1 l.

 Nobles in 1 Mark 2) 381 Nobles.

Answ. 190 Marks and 1 Noble*Example 21, and Proof to the last*

Marks. Noble.

In 190 : 1, how many

2 N.

 Nobles in 1 l. 3) 381 Nobles.

Answ. 127 l.

Reduction.

69

Example 22.

In 11 Pistoles, how many Pounds?

33 Six-pences in 1 Pistole:
11 Pistoles.

4) 363 Six-pences.

Answ. 9.0 ss. 1 s. 6 d.

Example 23, and Proof to the last.

l. s. d.

In 9 : 1 : 6, how many Pistoles?

40 Six-pences in 1 l. and 3 taken in;

3) 363 Six-pences.
11) 121

Answ. 11 Pistoles.

Example 24.

In 160 Moidores, how many Pounds?

9
1440 } 27 s. in 1 Moidore.
3

2) 4320 s.

Answ. 216.0 ss.

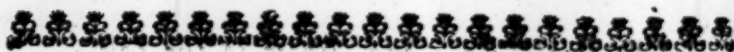
Example

Example 25:

In 57 Johannes's, how many Pounds?

$$\begin{array}{r} 6 \\ \hline 342 \\ 6 \end{array} \left. \vphantom{\begin{array}{r} 6 \\ \hline 342 \\ 6 \end{array}} \right\} 36 \text{ ss. in 1 } \textit{Job}.$$

Ans^w. 205.2 ss.



CLOTH MEASURE.

Example 1.

In 164 Yards of Cloth, how many Ells
4 Q. in 1 Yd. [Flemish?]

$$\text{Q. in 1 Ell F. } 3)656 \text{ Q.}$$

Ans^w. 218 Ells F. and 2 Q. of a Yd.

Example 2, and Proof to the last.

Ells F.

In 218 and 2 Q. of a Yd. how many Yards?

$$\begin{array}{r} 3 \text{ Q.} \\ \hline \end{array}$$

$$\text{Q. } 4) 656 \text{ Q.}$$

Ans^w. 164 Yd.

Example

Reduction.

71

Example 3.

In 413 Ells English, how many Yards?
half $\mathcal{Q}$. in 1 Yd. 8)4130 half $\mathcal{Q}$. by fixing a Cypher to the
— Ells instead of multiplying by 10.

Ans. 516 Yd. and 2 half $\mathcal{Q}$. or 1 $\mathcal{Q}$
—

Observe, if there was any odd Measure besides the Ells English, you may reduce all into half $\mathcal{Q}$. by fixing the half $\mathcal{Q}$. contain'd in the odd Measure to the Ells instead of a Cypher; as for instance the above Ells and 12 Nails are 4136 half $\mathcal{Q}$. &c.

Example 4, and Proof to the last.

Yd. $\mathcal{Q}$.
In 516 : 1, how many Ells English ?
8 half $\mathcal{Q}$.
—

413.0 half $\mathcal{Q}$. reduced into Ells English
— at eight, by cutting off the last figure with a prop instead of dividing by 10; then the figures on the left hand are Ells, that on the right is half $\mathcal{Q}$. therefore the *Answer* is 413 Ells.

Example 5.

In 174 Ells Flemish, how many Ells English ?
6
—

104.4 half $\mathcal{Q}$. are 104 Ells and 2 $\mathcal{Q}$. of a Yd. at eight.

Example

Example 6, and Proof to the last.

In 104 Ells English and 2 $\mathcal{Q}$. of a *Yd.* how many
[Ells Flemish?
6) 1044 half $\mathcal{Q}$. by fixing the half $\mathcal{Q}$. that are in
[2 $\mathcal{Q}$. to the Ells.

Answ. 174 Ells *F.*



ADDITION

Of divers Denominations:

R U L E.

TAKE care to place all Numbers that are of one Denomination under one another; then begin with the figures of the lowest Denomination, and add them together into one Sum; then reduce or bring that Sum into the next higher Denomination, which being done by Division, set down the Remainder under the Denomination added up, and carry the Quotient to the next higher Denomination; and so proceed from one Denomination to another, till all be done.

Note, To add up any Denomination into one Sum; first add up the Units place, and then the Tens, &c. as in whole Numbers.

Of MONEY.

Example 1.

Sold by a Mercer

	<i>l.</i>	<i>s.</i>	<i>d.</i>
Gross of Galloon at _____	2	14	—
Yards of Shalloon _____		6	8
Pieces of Serge _____	3	16	5
Yards 2 <i>Q.</i> of Damask _____	1	—	10
<i>Q.</i> 2 <i>N.</i> of Tabby _____		5	3

What is the Sum of all? *Answ.* 8 : 3 : 2

Example 2.

Suppose a Man has owing him by the following
s. viz.

	<i>l.</i>	<i>s.</i>	<i>d.</i>	<i>f.</i>
John Swift _____	6	14	9	2
Simon Noble _____	1	10	4	—
Peter Stout _____	18	4	6	3
Thomas Slow _____	9	17	7	1
Roger Grave _____	14	2	4	—
Anthony Rich _____	61	16	—	3
James Bayer _____	9	—	8	2

What has he owing him in all? 121 : 6 : 4 : 3

H

Example

Addition of

Example 3.

Bought of a Grocer

	<i>l.</i>	<i>s.</i>	<i>d.</i>
3 hd. of Sugar at	8	15	7
4 Barrels of Raisins	3	12	—
2 hd. of Tobacco	44	16	7
4 Bags of Pepper	5	4	8
3 Barrels of Ginger	42	5	9
6 C. of Gauls	33	9	7
27 lb. of Nutmegs	13	10	—

What is the Sum of all? *Answ.* 151 : 14 : 4 :

Example 4.

Suppose I lend my Friend 4 *l.* 17 *s.* 6 *d.* 2 *f.*
 16 *l.* 13 *s.* 4 *d.* and 156 *l.* 18 *s.* 9 *d.* 3 *f.* and
 Guineas, and a Pistole, and half a Crown, and
 Pence, what do I lend him in all?

<i>l.</i>	<i>s.</i>	<i>d.</i>	<i>f.</i>
4	17	6	2
16	13	4	—
156	18	9	3
8	8	—	—
	16	6	—
	2	6	—
	1	5	—

Answ. 187 : 18 : 1 : 1

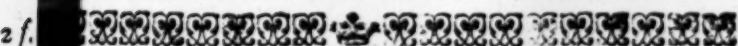
Exam

Example 5.

Suppose I borrow of a Man 29 l. 16 s. 4 d. 2 f.
141 l. 10 s. and 1 l. 16 s. 9 d. 3 f. and 250 l.
10 d. 1 f. and half a Guinea, and three half
pence, and 7 Groats, and 5 Farthings, what do I
owe in all?

	<i>l.</i>	<i>s.</i>	<i>d.</i>	<i>f.</i>
29	29	16	4	2
141	141	10	—	—
1	1	16	9	3
250	250	14	10	1
		10	6	—
		7	6	—
		2	4	—
			1	1

Answ. 424 : 18 : 5 : 3



TROY WEIGHT.

Example 1.

Bought of Edward Richman the following wt. of
Gold, viz.

<i>lb.</i>	<i>oz.</i>	<i>pw.</i>	<i>gr.</i>
7	3	19	19
4	—	14	23
	11	4	7
5	1	—	4
11	—	15	—

What is the weight of all? *Answ.* 28 : 5 : 14 : 5

Example

Example 2.

Sold to Anthony Careful as followeth, viz

A Silver Tankard weighing 2 lb. 9 oz. and 1 Silver Spoon weighing 4 oz. 7 pw. and a Silver Jug weighing 5 oz. 12 pw. 19 gr. and a Silver Saucer weighing 1 lb. 9 oz. 17 pw. 18 gr. I demand the sum of all?

lb. oz. pw. gr.

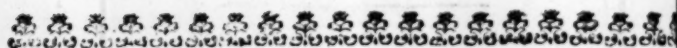
2 : 9 : — : —

4 : 7 : — : —

5 : 12 : 19 : —

1 : 9 : 17 : 18

Ans. 5 : 4 : 17 : 13



AVOIRDUPOIS WEIGHT

Example 1.

Bought of Ralph Fearful Grocer, at several times following Quantities of Sugar, viz.

T. C. Q. lb.

2 : 7 : 3 : 14

1 : 14 : 1 : 19

16 : 3 : 2 : 15

4 : 1 : 1 : 27

19 : 3 : 1 : 20

What is the quantity bought? 43 : 10 : 3 : 11 *Ans.*

Exam

Example 2.

Bought of Edward Trustwel the following weight of Tobacco, viz.

4 C. 3 Q. 14 lb. 12 oz. and 2 C. 3 Q. 16 lb. and Q. 11 lb. 15 oz. and 1 C. 2 Q. 11 lb. and 5 C. Q. 3 lb. 12 oz. what Quantity did I buy in all?

C.	Q.	lb.	oz.
4	3	14	12
2	3	16	—
	1	11	15
1	2	11	—
5	—	3	12

Ans. 14 : 3 : 1 : 7

CLOTH MEASURE.

Example 1.

Sold to Abraham Sly as followeth, viz.

Yds.	Q.	N.
45	1	3
16	3	2
247	2	1
9	1	2
156	—	3

What did I sell in all? Ans. 475 : 1 : 3

Example

Example 2.

Bought of Adam Bright the following Pieces of Bay
each containing as under, how many Yards were bought
in all ?

		Yards.
7 Ps.	} each containing {	39 Yd. are 273
14 Ps.		47 Yd. 653
11 Ps.		35 Ells English 481 : 1
17 Ps.		33 Ells Flemish 420 : 3

Answ. 1833 :



MULTIPLICATION

Of divers Denominations.

R U L E.

MULTIPLY the lowest Denomination first, and
that Product reduce into the next higher Deno-
mination by Division; the remainder (if there be any)
set down, and carry the Quotient in your mind; then
multiply the next Denomination, and to that Product
add what you carry'd in your mind; and that Sum
reduce into the next higher Denomination; and then
go on with every Denomination.

Of MONEY.

Example 1.

Example 2.

What is 3 times 15?

$$\begin{array}{r} \text{d.} \\ 15 \\ \times 3 \\ \hline 45 \end{array}$$

Ans. 45

$$\begin{array}{r} \text{s. d.} \\ 3 : 9 \text{ by } 5 \\ \hline 18 : 45 \end{array}$$

Ans. 18 : 45

Example 3.

Example 4.

What is the Product of 5 : 10 : 2, Multiplied by 6

$$\begin{array}{r} \text{s. d. f.} \\ 5 : 10 : 2 \\ \times 6 \\ \hline 30 : 0 : 12 \end{array}$$

Ans. 30 : 0 : 12

Multiplied by 7

$$\begin{array}{r} \text{s. d.} \\ 9 : 7 \text{ by } 7 \\ \hline 63 : 49 \end{array}$$

Ans. 63 : 49

Note, When there is above 12 in the Shillings, bring the Money into Two-shillings's, and Multiply.

Example 5.

Example 6.

Multiply 14 s. by 3.

Multiply 16 s. by 9.

$$\begin{array}{r} 14 \text{ s.} \\ \times 3 \\ \hline 42 \text{ s.} \end{array}$$

Ans. 42 s.

$$\begin{array}{r} 16 \text{ s.} \\ \times 9 \\ \hline 144 \text{ s.} \end{array}$$

Ans. 144 s.

Example 7.

s. d.

Multiply 16 : 6 by 11.

ss. s. d.

8 : — : 6

11

Ans. 9.0 : 1 : 6**Example 8.**

s. d. f.

Multiply 19 : 7 : 3 by 12.

ss. s. d. f.

9 : 1 : 7 : 3

12

Ans. 11.7 : 1 : 9 : —

See Example 22, page 69.

Example 9.

l. s.

Multiply 12 : 16 by 37.

ss.

128

37

896

384

473.6 ss.

l. s.

Mult. 2 : 2 by 197.

21 ss.

394

Ans. 413.7 ss.**Example 11.**

l. s.

Multiply 3 : 12 by 93.

$$\begin{array}{r} 6 \\ 558 \\ 6 \end{array} \left. \vphantom{\begin{array}{r} 6 \\ 558 \\ 6 \end{array}} \right\} 36 \text{ ss.}$$
Ans. 334.8

Note,

Note, Divers Denominations cannot easily be either multiplied or divided by a number above 12 in one; therefore when the Multiplier or Divisor is above 12, I shall multiply or divide by two Numbers whose product will be the Multiplier or Divisor, as in page 16:

Example 12.

l. s. d. f.

lt. 1 : 3 : 6 : 2 by 15.

ss. s. d. f.

11 : 1 : 6 : 2

$$\begin{array}{r} \text{---} \quad \text{---} \quad \text{---} \\ 35 : - : 7 : 2 \\ \text{---} \quad \text{---} \quad \text{---} \end{array} \left. \begin{array}{l} 3 \\ 5 \end{array} \right\} 15$$

17.6 : 1 : 1 : 2

Example 13.

l. s. d. f.

Mult. 1 : 17 : 5 : 1 by 25:

ss. s. d. f.

18 : 1 : 5 : 1

$$\begin{array}{r} \text{---} \quad \text{---} \quad \text{---} \\ 93 : 1 : 2 : 1 \\ \text{---} \quad \text{---} \quad \text{---} \end{array} \left. \begin{array}{l} 5 \\ 5 \end{array} \right\} 25$$

Answ. 46.7 : 1 : 11 : 1

Example 14.

s. d.

lt. 14 : 10 by 56.

s. s. d.

7 : - : 10

$$\begin{array}{r} \text{---} \quad \text{---} \quad \text{---} \\ 51 : 1 : 10 \\ \text{---} \quad \text{---} \quad \text{---} \end{array} \left. \begin{array}{l} 7 \\ 8 \end{array} \right\} 56$$

5 : - : 8 Answ.

Example 15.

l. s. d.

Mult. 8 : 17 : 6 by 64.

ss. s. d.

88 : 1 : 6

$$\begin{array}{r} \text{---} \quad \text{---} \quad \text{---} \\ 710 : - : - \\ \text{---} \quad \text{---} \quad \text{---} \end{array} \left. \begin{array}{l} 8 \\ 8 \end{array} \right\} 64$$

568.0 ss. Answ.

Example 13, page 65.

Note, When the Multiplier is one more than the product of any two Numbers under 13, as you multiply by the latter of the two Numbers, take in the top line, as in the two next Examples.

Note,

I

Example

Example 16.

l. s. d.
Mult. 2 : 9 : 4 by 73.

ss. s. d.
 24 : 1 : 4

$$\begin{array}{r} \text{---} 9 \\ 222 : - : - \\ \text{---} 8 \end{array} \left. \begin{array}{l} 72 \text{ and top} \\ \text{line took} \\ \text{in by 8.} \end{array} \right\}$$

180.0 : 1 : 4 *Answ.*

See Example 15, page 66.

Example 17

l. s. d.
Mult. 7 : 14 : 4 by

ss. s. d.
 77 : - : 4

$$\begin{array}{r} \text{---} 9 \\ 694 : 1 : - \\ \text{---} 9 \end{array} \left. \begin{array}{l} 81 \text{ and} \\ \text{line} \\ \text{in by} \\ \text{last 9} \end{array} \right\}$$

632.7 : 1 : 4 *Answ.*

See Example 17,

But if the Multiplier be 15, 17, 19, 21, 25, first multiply by half the Multiplier, and the Product down twice; then those Sums added together with the Multiplicand give the *answer*.

Example 18.

l. s. d. f.
Mult. 1 : 3 : 6 : 2 by 15.

ss. s. d. f.
 11 : 1 : 6 : 2

$$\begin{array}{r} \text{---} 7 \\ 82 : - : 9 : 2 \\ 82 : - : 9 : 2 \end{array}$$

Ans. 17.6 : 1 : 1 : 2

See Example 12, page 81.

Example 19

l. s. d.
Mult. 2 : 13 : 5

ss. s. d.
 26 : 1 : 5

$$\begin{array}{r} \text{---} 9 \\ 240 : - : 9 \\ 240 : - : 9 \end{array}$$

Ans. 50.7 : - : 1

An



Other method of **MULTIPLYING.**

When the Multiplier does not exceed 12 with any number of Cyphers at the right hand, as 30, 800, 100, &c.

R U L E.

When the Money is brought into Two-shillings's, multiply neglecting the Cypher or Cyphers which are in the Multiplier, and instead of setting down the Product in its usual place, set it down in any other Denomination by it self, Units under Units, &c. then fix to the right hand of the first Money the Cypher or Cyphers which belong to your Multiplier, then reduce the Money into Two-shillings's the *Answer*.

Example 1.

l. s. d.

1. 1 : 13 : 6 by 10. Here, when I multiplied

ss. s. d.

16 : 1 : 6

10

d:

6

1 s.

16 ss.

by one, I put down the Product, every Denomination by it self, Units under Units, &c. as is taught in the Rule : now there being one Cypher in the multiplier, I fix it to the right hand of the first money, which here is Pence, and then reduce as follows :

Observe

$$\begin{array}{r}
 d. \\
 12) 60 \\
 \hline
 2) 15 s. \\
 \hline
 \end{array}$$

16.7 ss. 1 s. *Answ.*

Observe, in this Example I reduce the Pence, &c. in Two-shillings's ; but where there is only one Cypher in the Multiplier, there is no occasion to reduce the Money any higher than Shillings ; for you may have the *answer* in Pounds, &c. without further trouble, as the 4 Examples following.

Example 2.

Example 3.

l. s. d. f.
Mult. 1 : 19 : 8 : 3 by 30. *l. s. d. f.*
Mult. 2 : 14 : 4 : 3 by 4

$$\begin{array}{r}
 ss. s. d. f. \\
 19 : 1 : 8 : 3 \\
 \hline
 30 \\
 \hline
 \end{array}$$

$$\begin{array}{r}
 f. \\
 4) 10 \\
 \hline
 12) 22 d. 2 f. \\
 \hline
 \end{array}$$

Answ. $\left\{ \begin{array}{l} 11 s. 10 d. 2 f. \\ 59 l. \end{array} \right.$

$$\begin{array}{r}
 ss. s. d. f. \\
 27 : - : 4 : 3 \\
 \hline
 60 \\
 \hline
 \end{array}$$

$$\begin{array}{r}
 f. \\
 4) 20 \\
 \hline
 12) 45 d. \\
 \hline
 \end{array}$$

Answ. $\left\{ \begin{array}{l} 03 s. 6 d. \\ 163 l. \end{array} \right.$

Example

Example 4.

Example 5.

l. s. d.

Mult. 2 : 9 : 8 by 70.

ss. s. d.

24 : 1 : 8

70

d.

12) 80

Ans^w { 16 s. 8 d.
173 l.

l. s. d. f.

Mult. 4 : 19 : 8 : 3 by 120.

ss. s. d. f.

19 : 1 : 8 : 3

120

d.

12) 90

Ans^w { 07 s. 6 d.
238 l.

Example 6.

Example 7.

l. s. d.

Mult. 2 : 13 : 9 by 100.

ss. s. d.

26 : 1 : 9

100

d.

12) 900 two Cyphers fixed,

— there being two in

2) 175s. the Multiplier,

Ans^w. 268.7 ss. 1 s.

l. s. d.

Mult. 3 : 16 : 6 by 600.

ss. s. d.

38 : — : 6

600

s.

2) 100

2295.0 ss.

Ans^w.

Example

Example 8.

d. f.
Mult. 1 : 3 by 1000.
 1000

f.
 4)3000

12)1750 *d.*

2) 145 *s. 10 d.*

Answ. 7.2 ss. 1 s. 10 d.

Example 9.

l. s. d.
Mult. 6 : 8 : 9 by 12
ss. s. d.
 64 : — : 9

1200

s.
 2)100

Answ. 7725.0 ss.

Example 10.

l. s. d.
Multiply 63 : 11 : 6 by 7000.

ss. s. d.
 635 : 1 : 6
 7000

d.
 12) 6000

2) 0500 *s.*

Answ. 445025.0 ss.

Exam

Example 11.

l. s. d.
Mult. 1 : 15 : 7 by 7007.

ss. s. d.
17 : 1 : 7
7007

124 : 1 : 1
24541 : 1 : 4

2466.6 : — : 5
Anfw.

d.
1000

1083 s. 4 d.

124541ss. 1s. 4d.
Prod. by 7000.

In this Example or in any other, where there are two or more figures alike in the Multiplier, when you have multiplied by the first of them, you only need to set down the same Money for as many as are alike, then fix the proper number of Cyphers to their first money, and reduce.

Example 12.

l. s. d.
Multiply 3 : 15 : 9 by 666.

ss.	s.	d.	d.
37	1	9	60
	666		-----
227	—	6	05 s.
2272	1	—	-----
22725	—	—	2272 ss. 1 s.

			d.
2522.4	1	6	600

			050 s.

			22725 ss.

See Example 16, page 66.

By

By the foregoing Rules you may multiply by a Multiplier whatever : thus,

Example 13.

i. s. d.
Mult. 2 : 9 : 4 by 73.

<i>ss. s. d.</i>	<i>d.</i>
24 : 1 : 4	40
73	—
74 : — : —	13 s. 4 d.
1726 : 1 : 4	1726 ss. 1 s. 4 d.
—	Product by 70.

Ans. 180.0 : 1 : 4

See Example 16, page 82.

Here I multiplied by then by 70 the same manner as in Example page 84, added both Products together for the *Ans.*

Example 14.

l. s. d. f.
Mult. 2 : 14 : 4 : 3 by 61.

<i>ss. s. d. f.</i>	<i>f.</i>
27 : — : 4 : 3	20
61	—
1631 : 1 : 9	45 d.
—	03 s. 9 d.
<i>Ans.</i> 165.9 : — : 1 : 3	1631 ss. 1 s. 9 d.

Here instead of multiplying by 1, the Multiplier and the Multiplicand stand for that Product ; then multiply by 61 &c.

Example *Ans.*

Divers Denominations.

89

Example 15.

s. d.
t. 14 : 7 by 465.

I s. s. d.
d by : — : 7
70 465

e ma
Ex. : — : 11
s. a : 1 : —
th P : 1 : 4

Oge
Anja : 1 : 3

d.
60
—
15 s.

Here I multiplied
by 5, 60, and 400.

437 ss. 1 s.

d.
400
—
033 s. 4 d.

2916 ss. 1 s. 4 d.



Troy WEIGHT.

Example 1.

infte
t. p. ly
ne M
d stan
at P
ther
y by
is the weight of 27 Silver spoons, each 2 oz. .
9 gr. ?

lb. oz. pw. gr.
2 : 18 : 9

3
—
8 : 15 : 3 } 27
9

amp
infco. lb. 6 : 6 : 16 : 3

K

Example

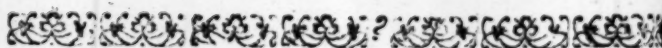
Multiplication of

Example 2.

What weighs 37 Spoons, each $\begin{matrix} \text{oz.} & \text{pw.} & \text{gr.} \\ 3 & 11 & 13 \end{matrix}$?

$$\begin{array}{r} : 9 : 9 : 6 \\ \hline : 9 : 9 : 6 \\ \hline : 9 : 9 : 6 \end{array} \left. \begin{array}{l} 6 \\ 36 \\ \text{top} \\ \text{take} \end{array} \right\}$$

Ans. lb. 11 : — : 7 : 1



Avoirdupois WEIGHT.

Example 1.

What is the weight of 25 Firkins, each $\begin{matrix} \text{Q.} & \text{lb.} \\ 3 & 11 \end{matrix}$?

$$\begin{array}{r} 4 : 1 : 4 \\ \hline 4 : 1 : 4 \end{array}$$

Ans. $\begin{matrix} \text{T.} & \text{C.} & \text{Q.} & \text{lb.} \\ 1 & 1 & 1 & 20 \end{matrix}$

Example 2.

What is the weight of 36 Hd. each $\begin{matrix} \text{C.} & \text{Q.} & \text{lb.} \\ 9 & 2 & 14 \end{matrix}$?

$$\begin{array}{r} 2 : 17 : 3 : - \\ \hline 2 : 17 : 3 : - \\ \hline 2 : 17 : 3 : - \end{array}$$

Ans. T. 17 : 6 : 2 : -

observe, in *Troy* and *Avoirdupois* Weight, &c. when Multiplier is such that you cannot multiply according the first method of Multiplication; you may reduce weight into one Denomination, and then multiply, follows:

Example 3.

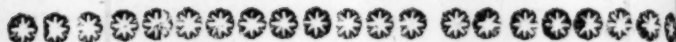
1 Hoghead of Sugar weighs 15 : 3 : 15, what weight of 185 Hogheads?

$$\begin{array}{r}
 C. \quad 2. \quad lb. \\
 15 : 3 : 15 \\
 15 \\
 15 \\
 15 \\
 84 lb. \text{ or } 3 \text{ } 2. \\
 15 lb. \\
 \hline
 1779 lb. \text{ in } 1 \text{ Hd.} \\
 + 83 \text{ Hd.} \\
 8895 \\
 14232 \\
 \hline
 \end{array}$$

$$\begin{array}{r}
 28 \left\{ \begin{array}{l} 4) 329115 \text{ the weight in } lb. \\ 7) 82278 : 3 \text{ } lb. \\ 4) 11754 \text{ } 2. \text{ } 0 \end{array} \right\} 3 \\
 \hline
 210) 29318 \text{ C. } 2 \text{ } 2.
 \end{array}$$

Ans. 146 T. 18 C. 2 2. 3 lb.

Cloth



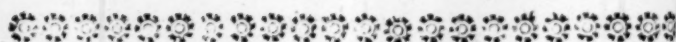
Cloth MEASURE.

Example.

How many Yards are there in 57 Pieces of Cloth each *qt.* 35 *Yd.* 3 *Q.* 1 *N.*?

<i>Yd.</i> <i>Q.</i> <i>N.</i>		Or thus,	
35 : 3 : 1		<i>Yd.</i> <i>Q.</i> <i>N.</i> <i>N.</i>	
	8	35 : 3 : 1	4) 10
286 : 2 : —	}	57	4) 02
7			
	56 and top line taken in.	250 : 2 : 3	1790 : 2
2041 : 1 : 1		1790 : 2 : 2	<i>Yd.</i> <i>Q.</i>

Ans. 2041 : 1 : 1 as before.



S U B T R A C T I O N

Of Divers Denominations.

R U L E.

Place the numbers, which are of alike name or denomination, under each other, as in *Addition*; then begin with the lowest Denomination, and Subtract the lower number from the upper, setting down what remains; but if it happen that the lower number cannot be Subtracted out of the upper; then borrow so many of the same Denomination as will make

the next higher Denomination, and *Subtract* the lower number from that, and what remains add to the upper number, which sum put down; then go to the next Denomination adding or paying one to the lower number for the number you borrow'd, then *Subtract* as before, and so do in all the Denominations.

Of MONEY.

Example 1.

Example 2.

	<i>l.</i>	<i>s.</i>	<i>d.</i>	<i>f.</i>
Lent	876	: 14	: 11	: 1
Reiv'd	147	: 16	: 4	: —
Remains	728	: 18	: 7	: 1
Proof	876	: 14	: 11	: 1

	<i>l.</i>	<i>s.</i>	<i>d.</i>	<i>f.</i>
	6714	: 16	: 7	: 1
	1619	: 13	: 9	: 3
	5095	: 2	: 9	: 2
	6714	: 16	: 7	: 1

Example 3.

Borrow'd of my Friend 141 *l.* 16 *s.* 9 *d.* and 61 *l.* 4 *d.* 1 *f.* and Paid him 159 *l.* 17 *s.* 8 *d.* 2 *f.*
What remains to pay?

	<i>l.</i>	<i>s.</i>	<i>d.</i>	<i>f.</i>
Borrow'd	{ 141	: 16	: 9	—
	{ 61	: —	: 4	: 1

Borrow'd in all	202	: 17	: 1	: 1
Paid	159	: 17	: 8	: 2
Remains	42	: 19	: 4	: 3

Proof 202 : 17 : 1 : 1

Example

Example 4.

Lent my Friend 104 l. 16 s. 4 d. 1 f. and
Guineas, and 3 half Crowns, and Receiv'd 15 l. 11
and half a Guinea, what remains?

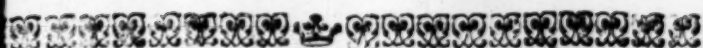
	<i>l.</i>	<i>s.</i>	<i>d.</i>	<i>f.</i>		<i>l.</i>	<i>s.</i>
Lent {	104	16	4	1	Receiv'd {	15	11
	15	15	—	—			10
		7	6	—			
					Sum Rd.	16	11
Sum Lent	120	18	10	1			
Sum Rd.	16	1	6	—			
Remains	104	17	4	1			
Proof	120	18	10	1			

Example 5.

Suppose I am to pay 100 and have but 31 : 15 : 7
what must I borrow to pay the whole Debt?

	<i>l.</i>	<i>s.</i>	<i>d.</i>	<i>f.</i>	
	100	—	—	—	
	31	15	7	3	
Ans ^w .	68	4	4	1	
Proof	100	—	—	—	

T



Troy WEIGHT.

Example 1.

Example 2.

	lb.	oz.	pw.	gr.
Bought	71	11	19	13
Sold	19	10	15	19
Unfold	52	1	3	18
Proof	71	11	19	13

	lb.	oz.	pw.	gr.
Bought	6	—	4	3
Sold	4	11	17	9
Unfold	1	—	6	18
Proof	6	—	4	3

Example 3.

Bought 7 lb. 3 oz. 19 pw. 18 gr. and 3 lb. 0 oz. 5 pw. 5 gr. of Silver, and Sold 9 lb. 9 oz. 11 pw. 18 gr. what remains unfold?

	lb.	oz.	pw.	gr.
Bought {	7	3	19	18
	3	—	14	5
Bought in all	10	4	13	23
Sold	9	9	11	3
Ans. Unfold	7	2	20	
Proof	10	4	13	23

Example

Avoirdupois WEIGHT,

Example 1.

Example 2.

	C.	Q.	lb.	T.	C.	Q.	lb.	oz.	dr.
Bought	16	3	14	4	19	1	21	13	1
Sold	14	2	19	3	18	2	26	14	1
Unfold	2	—	23	1	—	2	22	15	—
Proof	16	3	14	4	19	1	21	13	1

Example 3.

A Grocer bought 17 C. 1 Q. 19 lb. of Sugar, and
 Sold 2 C. 3 Q. 14 lb. and 12 C. 0 Q. 27 lb. and
 1 C. 2 Q. 13 lb. what remains unfold?

	C.	Q.	lb.		C.	Q.	lb.
Bought	17	1	19		2	3	14
Sold	16	2	26	Sold	12	—	27
					1	2	13
Remains	2	—	21				
Proof	17	1	19	Sold in all	16	2	26

Cloth

Cloth MEASURE.

Example 1.

Example 2.

Yd. Q. N.

Ells Eng. Q. N.

Bought 34 : 3 : 2

87 : 1 : 3

Sold 16 : 2 : 3

14 : 3 : 2

Sold 18 : — : 3

72 : 3 : 1

34 : 3 : 2

87 : 1 : 3

DIVISION

Of Divers Denominations.

THIS Rule teaches to find the Price, Weight, or Measure of one, if the Price, &c. of any Quantity the same be given.

R U L E.

Divide the Price, &c. by the Quantity, beginning with the highest Denomination ; and if any thing remain, bring it into the next Denomination, adding to it what there is of that next Denomination ; this Sum divide again, and thus go on with all the Denominations.

L

Of

Division of
Of MONEY.

Example 1.

If 3 Yd. of Cloth cost $\begin{smallmatrix} s. & d. \\ 3 & : 9 \end{smallmatrix}$, what will 1 Yd. cost?

Which is done by dividing $\begin{smallmatrix} s. & d. \\ 3 & : 9 \end{smallmatrix}$ by 3:

$$\begin{array}{r} \begin{smallmatrix} s. & d. \\ 3 & : 9 \end{smallmatrix} \\ \hline 1 : 3 \end{array} \text{ Answ.}$$

Example 2.

If 5 Yd. cost $\begin{smallmatrix} s. & d. \\ 18 & : 9 \end{smallmatrix}$, what will 1 Yd. cost?

$$\begin{array}{r} \begin{smallmatrix} s. & d. \\ 5 & : 18 : 9 \end{smallmatrix} \\ \hline 3 : 9 \end{array} \text{ Answ.}$$

Example 3.

If 1 Yd. 2 Q. cost $\begin{smallmatrix} l. & s. & d. \\ 1 & : 15 & : 3 \end{smallmatrix}$, what cost 2 Q. 6 Yd.?

$$\begin{array}{r} \begin{smallmatrix} l. & s. & d. & f. \\ 2.6 & : 1 & : 15 & : 3 \end{smallmatrix} \\ \hline \text{Answ. } 5 : 10 : 2 \end{array}$$

e, When there is above 1 in the Pounds place,
you divide, bring the Money into Two-shillings's.

Example 4.

J. s. d.
1 lb. 3 $\mathcal{L}$. cost 3 : 7 : 1, what cost 1 $\mathcal{L}$. ?

$$\begin{array}{r} \text{ss. s. d.} \\ \mathcal{L}. 7 \overline{) 33 : 1 : 1} \end{array}$$

$$\text{Answ. } .4 : 1 : 7$$

Example 5.

Example 6.

l. s. *Ells l. s.*
cost 5 : 12, what | If 9 cost 7 : 4, what cost 1 ?

$$\begin{array}{r} \text{ss.} \\ 8 \overline{) 56} \end{array}$$

$$\text{Answ. } .7 \text{ ss.}$$

$$\begin{array}{r} \text{ss.} \\ 9 \overline{) 72} \end{array}$$

$$\text{Answ. } .8 \text{ ss.}$$

Example 7.

l. s. d.
Pistoles be 9 : 1 : 6, what is the Value of 1 ?

$$\begin{array}{r} \text{ss. s. d.} \\ 11 \overline{) 90 : 1 : 6} \end{array}$$

$$\text{Answ. } .8 : - : 6$$

Example

Example 8.

If 12 Dozen cost $\begin{matrix} l. & s. & d. \\ 11 & : 15 & : 9 \end{matrix}$, what cost 1?

$$\begin{array}{r} ss. \quad s. \quad d. \quad f. \\ 12 \overline{) 117 : 1 : 9} \end{array}$$

Ans. $.9 : 1 : 7 : 3$

These 8 last Examples are *Proofs* to the Examples in pages and 80.

Example 9.

If 15 Yd. cost $\begin{matrix} l. & s. & d. & f. \\ 17 & : 13 & : 1 & : 2 \end{matrix}$, what cost 1?

$$\begin{array}{r} ss. \quad s. \quad d. \quad f. \\ 5 \overline{) 176 : 1 : 1 : 2} \end{array}$$

$$\begin{array}{r} 3 \overline{) 35 : - : 7 : 2} \end{array}$$

Ans. $1.1 : 1 : 6 : 2$

Example 10.

If 25 Ells cost $\begin{matrix} l. & s. & d. & f. \\ 46 & : 15 & : 11 & : 1 \end{matrix}$, what cost 1?

$$\begin{array}{r} ss. \quad s. \quad d. \quad f. \\ 5 \overline{) 467 : 1 : 11 : 1} \end{array}$$

$$\begin{array}{r} 5 \overline{) 93 : 1 : 2 : 1} \end{array}$$

Ans. $1.8 : 1 : 5 : 1$

Example 11.

Example 12.

C. l. s. d.
56 cost 41 : 10 : 8,
what cost 1 C. ?

l.
If 64 Packs cost 568,
what cost 1 ?

$$\begin{array}{r} \text{ss.} \quad \text{s.} \quad \text{d.} \\ 7) 415 : - : 8 \\ \hline 8) 59 : - : 8 \\ \hline \end{array}$$

Ans. .7 : - : 10

$$\begin{array}{r} \text{ss.} \\ 8) 5680 \\ \hline 8) 710 \\ \hline \end{array}$$

Ans. 8.8 : 1 : 6

The Examples 9, 10, 11, and 12 last, are *Proofs* to
Examples 12, 13, 14, and 15 in page 81.

Observe, in such Examples as these, if there be any
remainder after the Farthings are divided, you must
add the true Remainder as was taught in page 31.

Example 13.

C. l. s. d. f.
If 66 cost 186 : 16 : 9 : 2, what cost 1 ?

$$\begin{array}{r} \text{ss.} \quad \text{s.} \quad \text{d.} \quad \text{f.} \\ 6) 1868 : - : 9 : 2 \\ \hline 11) 311 : - : 9 : 2 : 2 \\ \hline 2.8 : - : 7 : 1 : 7 \end{array} \left. \begin{array}{l} \\ \\ \end{array} \right\} \begin{array}{l} 44 \text{ f. Rem.} \\ 66 \text{ Divisor.} \end{array}$$

l. s. d. f.
Ans. 2 : 16 : 7 : 1 $4\frac{4}{66}$ f. Remains.

Example

Example 14.

l. s. d. f.

If 72 Firkins cost 150 : 17 : 8 : 1, what cost 1

$$\begin{array}{r} \text{ss.} \quad \text{s.} \quad \text{d.} \quad \text{f.} \\ 8)1508 : 1 : 8 : 1 \end{array}$$

$$\begin{array}{r} 9)188 : 1 : 2 : 2 : 1 \\ \hline 2.0 : 1 : 10 : 3 : 7 \end{array} \left. \begin{array}{l} \\ \\ \end{array} \right\} \begin{array}{l} 57 \\ 72 \end{array}$$

$$\begin{array}{r} \text{l.} \quad \text{s.} \quad \text{d.} \quad \text{f.} \\ \text{Answ. } 2 : 1 : 10 : 3 \end{array} \begin{array}{l} 57 \\ 72 \end{array}$$

Note, When the Divisor cannot be found in the Multiplication Table, after the Two-shillings's divided, reduce the Remainder (if there be any) into Shillings, and then into Pence, taking in the odd Shillings and Pence if there be any ; then divide again and so on.

Or, first reduce the Price into one Denomination then divide by the Quantity and reduce the Quotient into Two-shillings's.

Example 15. Example 16.

If 37 Packs of Wooll cost 473 l. 12 s. what cost 1 ?

If 197 Pieces cost 4137 l. 14 s. what cost 1 ?

$$\begin{array}{r} \text{ss.} \\ 37)4736 \quad (12.8 \text{ ss. Answ.} \end{array}$$

$$\begin{array}{r} 103 \\ \hline 296 \\ \hline \end{array}$$

$$\begin{array}{r} \text{ss.} \\ 197)4137 \quad (2.1 \text{ ss.} \end{array}$$

$$\begin{array}{r} 197 \\ \hline \end{array}$$

Exa

Example 17.

If 73 Pieces cost 180 : 1 : 4, what will 1 cost ?

ss. s. d.
3) 1800 : 1 : 4 (24 ss.

340

48 ss.

2

97 s.

12

1168 d. (16 d.

438

Ans. 2 l. 9 s. 4 d.

Or thus,

ss. s. d.
1800 : 1 : 4

6 Groats,

6)

73) Gr. 10804 (148 Groats.

350

584

2.4 ss. 1 s. 4 d
Ans.

The Examples 15, 16, and 17 last are *Proofs* to Examples 9, 10, and 16 in pages 80 and 82:

Example

Example 18.

If 82 C. cost 285 ^{l.} : 16 ^{s.} : 7 ^{d.}, what will 1 C. cost

$$\begin{array}{r} \text{ss.} \quad \text{s.} \quad \text{d.} \\ 82) 2858 : - : 7 \quad (3.4 \text{ ss.} \end{array}$$

$$\begin{array}{r} \text{..} \\ 398 \\ \hline \end{array}$$

$$\begin{array}{r} 70 \text{ ss.} \\ 2 \\ \hline \end{array}$$

$$\begin{array}{r} 140 \text{ s.} \\ 12 \\ \hline \end{array}$$

$$82) 1687 \text{ d.} \quad (20 \text{ d.}$$

$$\begin{array}{r} \text{..} \\ 47 \text{ d.} \\ 4 \text{ f.} \\ \hline \end{array}$$

$$82) 188 \text{ f.} \quad (2 \text{ f.}$$

$$\begin{array}{r} 24 \text{ Rem.} \end{array}$$

$$\begin{array}{r} \text{l.} \quad \text{s.} \quad \text{d.} \quad \text{f.} \\ \text{Ans.} \quad 3 : 9 : 8 : 2 \frac{24}{82} \end{array}$$

Or thus,

$$\begin{array}{r} \text{ss.} \quad \text{s.} \quad \text{d.} \\ 2858 : - : 7 \\ 2 \\ \hline \end{array}$$

$$\begin{array}{r} 5716 \text{ s.} \\ 12 \\ \hline \end{array}$$

$$82) 68599 \text{ d.} \quad (836 \text{ d.}$$

$$\begin{array}{r} 299 \\ \hline \end{array}$$

$$\begin{array}{r} 539 \\ \hline \end{array}$$

$$\begin{array}{r} 47 \text{ d.} \\ 4 \\ \hline \end{array}$$

$$82) 188 \text{ f.} \quad (2 \text{ f.}$$

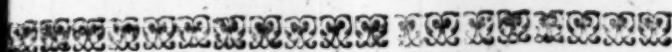
$$\begin{array}{r} 24 \text{ Rem.} \end{array}$$

$$2) 69 \text{ s.} \quad 8 \text{ d.}$$

$$\begin{array}{r} 3.4 : 1 : 8 : 1 \\ \text{ss.} \quad \text{s.} \quad \text{d.} \quad \text{f.} \\ \text{Ans.} \end{array}$$

T

cle 2
89,



Troy WEIGHT.

Example 1.

Example 2.

Silver spoons weigh | If 37 Spoons weigh 11 lb.
6 oz. 16 pw. 3 gr. | — oz. 7 pw. 1 gr. what
is the weight of 1? | is the weight of 1?

oz. pw. gr.

6 : 16 : 3

2 : 5 : 9

2 : 18 : 9

lb oz pw. gr.

11 : — : 7 : 1

12

37) 132 oz. (3 oz.

21 oz. Remains.

20 pw. & 7 pw. taken in.

37) 427 pw. (11 pw.

57

20 pw. Remains.

24 gr. and 1 gr. taken in.

37) 481 gr. (13 gr.

111

oz. pw. gr.

Answ 3 : 11 : 13

These 2 Examples are Proofs to Examples 1, and 2
89, and 90.

M

Avoirdupois

Avoirdupois WEIGHT,



Example 1.

Example 2.

If 25 Firkins weigh
1 T. 1 C. 1 Q. 20 lb.
what does 1 weigh?

T. C. Q. lb.
5) 1 : 1 : 1 : 20

5) 4 : 1 : 4

Answ. 3 : 12
1 Q. lb.

If 36 Hogsheds
17 T. 6 C. 2 Q.
does 1 weigh?

T. C. Q.
6) 17 : 6 : 2

6) 2 : 17 : 3

Answ. 9 : 2

3 last
Exa page

Example 3.

What weighs 1 Hoghead, if 185 weigh
146 T. 13 C. 2 Q. 3 lb.?

20

185) 2938 C. (15 C.

1088

163 C.

163

163

163

56 lb. or 2 Q.

3 lb.

185) 18315 lb. (99 lb. or 3 Q. 15 lb.

1665

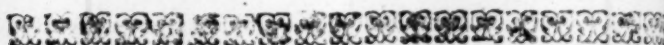
...

C. Q. lb.

Answ. 15 : 3 : 15

3 last Examples are *Proofs* to Examples 1, 2,
pages 90, and 91.

Cloth



Cloth MEASURE.

Example, and Proof to Example in page

Yd. Q. N.

If 57 Pieces of Cloth contain 2041 : 1 : 1,
does 1 Piece contain ?

$$\begin{array}{r} \text{Yd.} \quad \text{Q.} \quad \text{N.} \\ 57) \, 2041 : 1 : 1 \quad (35 \, \text{Yd.} \end{array}$$

331

46 Yd.
16 N.

$$57) \, 741 \, \text{N.} \quad (13 \, \text{N. or } 3 \, \text{Q.}$$

171

Yd. Q. N.

Answ. 35 : 3 : 1

PRACTICE

PRACTICE.

BY this Rule, if the Price of one be given, you may quickly find the *Answer* to any Quantity of same; therefore it is of excellent use among Merchants, Tradesmen, &c. And from its being used so frequently, is called the Rule of *Practice*.

R U L E.

Always suppose the Quantity to be so many Two-shillings's, for that is the *Answer* if the Price be at Two-shillings; and if the price be above Two-shillings, reduce that also into Two-shillings; then *Multiply* every of the Sums by the Two-shillings's in the other Sum, and if there be any other Money in the Sum in which is your *Multiplier*, or if either Sum be under Two-shillings, divide it into even parts of Two-shillings, such as 12 d. 8 d. 6 d. 4 d. 3 d. 2 d. then work for those even parts by taking such parts of the other Sum as the even parts are of Two-shillings; and if there be any odd Money besides the even parts, take such a part of some of those parts as the odd Money is of that part. Observe, if there be any Remainder, when-ever you divide Two-shillings's, consider what part of Two-shillings your Divisor is, the Remainder will be so many of those parts.

Example

Example 1.

What will 9 Yd. of Cloth come to at 3 : 14 : 7
per Yd. ?

9ss.

l. s. d.

at 3 : 14 : 7

ss. s. d.

37 : — : 7

9

Example 2.

Ells l. s.
416 at 1 : 16 per Ell.

416 ss:

18 ss. in 1 l. 16 s.

748.8 ss.

Answ.

C. l. s. d.

31 at 3 : 5 : 8

31 ss. ss. s. d.

32 : 1 : 8

31 ss.

985 : — : —

s.

10

Answ. 101.7 : 1 : 8

985

ss.

Observe. in these Examples, as either Sum may
Multiplied by the Two-shillings's of the other Sum, &
therefore you have two methods of working, wh^{ch}
may serve to prove each other; and one of them,
there be no parts in the Quantity, will be perform'd
Multiplication only. These Questions may also
perform'd by Reduction, considering the Quantity
be Pieces of Money at so much per Piece as the Price

Exam

Example 4.

82 Pieces at $7 : 14 : 4$

$ss. \quad s. \quad d.$
 $77 : - : 4$

7.16) 82 ss.
77 ss.

574
574
 $13 : 1 : 4$

632.7 : 1 : 4

Exam. 17, p. 82.

This Example explain'd.
When I have multiplied one
of the Sums by the Two-
shillings's of the other Sum,
viz. 82 ss. by 77 ss. then for
the other Money which is
4 d. it being a sixth part of
Two-shillings, I divide the
other Sum by 6 ; then that
Quotient added to the Product
of 77 gives the *Answer*.

Example 5.

91 Pieces at $2 : 18 : 3$

8) 91 ss.
29 ss.

$ss. \quad s. \quad d.$
 $29 : - : 3$

819
182

2621 : - : 6

$11 : - : 9$

265.0 : - : 9

265.0 : - : 9

Ans.

d.

30

02 s. 6 d.

2621 : - : 6

Example

Example 9.

$$\begin{array}{rcl}
 d. & & l. \quad s. \quad d. \\
 12 \frac{1}{2}) & 666 \text{ at } \text{---} & 3 : 15 : 9 \\
 & 37 \text{ ss.} & \text{ss.} \quad s. \quad d. \\
 \hline
 & & 37 : 1 : 9
 \end{array}$$

4662

$$\begin{array}{rcl}
 d. & 1998 & \\
 6 \left(\begin{array}{l} 2 \\ 2 \end{array} \right) & 333 & \\
 3 \left(\begin{array}{l} 2 \\ 2 \end{array} \right) & 166 : 1 & \\
 & 83 : - : 6 &
 \end{array}$$

Ans. $2522.4 : 1 : 6$ See Ex. 12, p. 87.

Example 10.

$$\begin{array}{rcl}
 14 \text{ Yd. at } 17 \text{ s.} & & \\
 8 \text{ ss.} & \text{ss.} & s. \\
 \hline
 & 8 : 1 &
 \end{array}$$

12

07

Ans.

14, p. 65.

Example 12.

$$\begin{array}{rcl}
 s. & d. & \\
 6 \text{ Yd. at } 14 : 10 & & \\
 7 \text{ ss.} & & \\
 \hline
 & &
 \end{array}$$

2

4

9 : - : 8

5 : - : 8

14, p. 81.

Example 11.

$$\begin{array}{rcl}
 d. & & s. \quad d. \\
 6 \frac{1}{4}) & 11 \text{ Pistoles at } 16 : 6 & \\
 & 8 \text{ ss.} & \\
 \hline
 & &
 \end{array}$$

88

2 : 1 : 6

9.0 : 1 : 6 Ans.

See Ex. 7, p. 80.

Example 13.

$$\begin{array}{rcl}
 d. & & s. \quad d. \\
 4 \frac{1}{6} \left. \begin{array}{l} 6 \\ 8 \end{array} \right\} & 465 \text{ Ells at } 14 : 7 & \\
 3 \frac{1}{8} & & \\
 \hline
 & 7 \text{ ss.} &
 \end{array}$$

3255

77 : 1

58 : - : 3

Ans. $339.0 : 1 : 3$
See Ex. 15, p. 89.

N

Example

Example 14.

d.		s.	d.
2 12)	16 Yd. at	12	: 2
	6 ss.	ss.	s. d.
		6	: - : 2
	96		4
	1 : - : 8		24 : - : 8
Ans/w.	9.7 : - : 8		4
			9.7 : - : 8

Example 15.

d.		s.	d.
3 8)	157 at	8	: 3
	4 ss.		
	628		
	19 : 1 : 3		
Ans.	64.7 : 1 : 3		

See Ex. 12, p. 64.

Example 16.

d.		s.	d.
4 6}	407 at	6	
3 3}	3 ss.		
	1221		
	67 : 1 :		
	50 : 1 :		
Ans/w.	133.9 : 1 :		

Example 17.

d.		s.	d.
8 3)	49 Gallons at	4	: 8
	49	ss.	s. d.
	16 : - : 8	2	: - : 8
			7
Ans/w.	11.4 : - : 8		16 : - : 8
			7
Ans/w.	11.4 : - : 8		

See Ex. 11, p. 64.

Observe, when the price is 4 s. and odd Mon
stead of multiplying by 2 ss. I set down the Q
twice, as in the first operation in the last Ex

Example 18.

s. d.

427 Ells at 3 : 2

Or thus, by *Reduction*.

ss.

427 Prod. by 1 ss.

s. d.

427 Pieces of 3 : 2
19 dd. 6

213 : 1

35 : 1 : 2

12) 8113 dd.

19 dd.

67.6 : — : 267.6 ss. — s. 2 d. Answ.

Example 19.

s. d.

421 at 1 : 6

Or thus, by *Red.*

s. d.

421 Pieces of 1 : 6
3

210 : 1

105 : — : 6

4) 1263 Six-pences.

31.5 : 1 : 6Answ. 31.5 ss. 1 s. 6 d.

Example 20.

s. d.

145 lb. of Tobacco at 1 : 3

72 : 1

18 : — : 3

ss. 7 : 1 : —

12

144, & top line
taken in.9.0 : 1 : 39.0 : 1 : 3 Answ.

See Ex. 9, p. 63.

Example

d. Example 21. *d.*

$$\begin{array}{r} 8 \overline{) 3} \} 35 \text{ Ells of Cloth at } 11 \\ 3 \overline{) 8} \} \end{array}$$

$$\begin{array}{r} 11 : 1 : 4 \\ 4 : - : 9 \\ \hline 5 \end{array}$$

$$\begin{array}{r} 7 \\ \hline 5 \end{array} \} 35$$

Ans. $1.6 : - : 1$

$$\begin{array}{r} 1 : 12 : 1 \\ \hline 1. \quad s. \quad d. \end{array}$$

Example 22.

$$\begin{array}{r} d. \\ 2 \overline{) 12} \} 700 \text{ Yd. at } \text{---} \\ f. \\ 1 \overline{) 8} \} 58 : - : 8 \\ 7 : - : 6 \\ 1 \} \end{array}$$

$$\begin{array}{r} d. \quad f. \\ 2 \overline{) 1} \\ \hline 700 \text{ ss.} \\ \hline f. \\ 300 \\ \hline 375 \text{ d.} \\ \hline 131 \text{ s. } 3 \text{ d.} \end{array}$$

Ans. $6.5 : 1 : 3$

Ans. $6.5 \text{ ss. } 1 \text{ s.}$

Observe, if the price be under 2 *d.* and you work by taking parts; first work for 3 *d.* or 4 *d.* then take the part or parts.

Example 23.

$$\begin{array}{r} d. \\ 3 \overline{) 3} \} 4714 \text{ lb. at } 3f. \\ f. \\ 3 \overline{) 4} \} 589 : - : 6 \text{ at } 3d. \end{array}$$

$$\begin{array}{r} 14.7 : - : 6 \\ \hline 1 : 2 \} \end{array}$$

See Ex. 10, p. 56.

Example 24.

$$\begin{array}{r} d. \\ 3 \overline{) 8} \} 30509 \text{ lb. at } 11 \\ f. \\ 1 \overline{) 12} \} 3813 : 1 : 3 \end{array}$$

Ans. $31.7 : 1 : 6$

See Ex. 9, p. 115.

Practice.

117

The Example at 1 *f.* per *Yd.* explain'd. The quantity being supposed to be the *Answer* at Two-shillings per *Yd.* first I find the answer at 3 *d.* per *Yd.* taking an 3th. part of the Two-shillings's; then 1 *f.* being the 12th. part of 3 *d.* I divide that answer by 12; when I have divided the Two-shillings's, instead of reducing the Remainder 9 and dividing again, as was taught in Division of Money; I consider according to the rule in page 109, what part of Two-shillings the Divisor is (which is Two-pence) and the Remainder I call many of those parts, *viz.* 9 Two-pences or 1 *s.* then I divide the other Money in the same line, which is 1 *s.* 3 *d.* and the Quotient is 1 *d.* 1 *f.* so the answer to the Question is 31 *l.* 15 *s.* 7 *d.* 1 *f.* serve the like in dividing any other Money.

	<i>d.</i>	<i>Example 25.</i>	<i>d.</i>	<i>f.</i>	
3	8)	72 Ounces at ———	1	:	1
		<i>d.</i>			9
1	3)	9 at 3			———
<i>f.</i>		<i>d.</i>			11 : 1
1	4)	3 at 1			8
		— : 1 : 6 at — : 1 <i>f.</i>			72
		—			
					<i>s.</i> 7 : 6 : — <i>Ans.</i>

Ans. .3 : 1 : 6

See Ex. 3, page 61.

Example 26.

Example 27.

	<i>dr.</i>	<i>d.</i>	<i>f.</i>		<i>d.</i>	<i>f.</i>	<i>q.</i>
12)	407	at	2 : 2	3	8)	471	at 3 : 1 : 1
				<i>f.</i>			
1)	33	1 : 10			1	12)	58 : 1 : 9
		8 : — : 6	7	4	1	4)	4 : 1 : 8
		5 : 25					1 : 3
		———					1 : — : 5 : 1
		———					3
		<i>Ans.</i> 4.2 : — : 9 : 2					4
		———					
							<i>Ans.</i> 6.5 : — : — : —
							3
							4

Ex. 3, page 61.

Here for 1 *q.* of a Farthing I took a 4th. part of the Farthing line.

Example 28.

<i>d.</i>	$\frac{2}{2} \left \begin{array}{c} 12 \\ 12 \end{array} \right\}$	$36 \text{ lb. at } \underline{\hspace{2cm}}$	<i>d. f.</i>	$4 : 1$	
				6	
<i>f.</i>	$1 \left \begin{array}{c} 8 \\ 8 \end{array} \right\}$	3		$s. 2 : 1 : 2$	6
		3			
		$- : - : 9$			
		$\underline{\hspace{2cm}}$			
		<i>Answ.</i> $.6 : - : 9$		$s. 12 : 9 : -$	<i>Answ.</i>

Example 29. Or thus, by Reduction.

<i>d.</i>	$3 \left \begin{array}{c} 8 \\ 12 \end{array} \right\}$	$416 \text{ Rd. at } 5 \text{ d.}$	$4) \quad 416 \text{ Pieces of } 5 \text{ d.}$	$416 \text{ Half-pence, by fix}$	
		52		$12) \quad 1040 \text{ d.}$	$a \text{ Cyp}$
		$34 : 1 : 4$			$instead$
		$\underline{\hspace{2cm}}$			$multiply$
		<i>Answ.</i> $8.6 : 1 : 4$		<i>Answ.</i> $8.6 : 1 : 4$	$by 10,$
					$half-pen$
					$in 5 \text{ d.}$

Example 30.

<i>d.</i>	$3 \left \begin{array}{c} 3 \\ 8 \end{array} \right\}$	$57 \text{ Ells at } \underline{\hspace{2cm}}$	<i>d. f. q.</i>	$6 : 1 : 2$	
				8	
<i>f. q.</i>	$1 : 2 \left \begin{array}{c} 8 \\ 8 \end{array} \right\}$	$7 : - : 3$		$s. 4 : 3 : -$	$56, \text{ and}$
		$7 : - : 3$			7 line taken
		$- : 1 : 9 : 4$			
		$\underline{\hspace{2cm}}$			
		<i>Answ.</i> $1.5 : - : 3 : 1 \frac{4}{8}$		$1 : 10 : 3 : 1 : 2$	<i>Answ.</i>
				$l. s. d. f. q.$	

Example 31.

$$\left. \begin{array}{l} dr. \quad d. \quad f. \\ 467 \text{ at } 8 : 2 \end{array} \right\}$$

$$77 : 1 : 8$$

$$8) 77 : 1 : 8$$

$$9 : 1 : 3$$

$$2 : 2$$

$$4) 7939 \text{ half-pence.}$$

$$12) 1984 \text{ dd. } 3 \text{ half-pence.}$$

$$f. 16.5 : - : 9 : 2$$

$$Ans. 16.5 \text{ ss. } - 3.9d. 2 f.$$

Or thus, by Reduction.

$$d. \quad f.$$

$$467 \text{ Pieces of } 8 : 2$$

$$17 \text{ half-pence in } 8 d. 2 f.$$

Example 32.

Example 33.

$$\left. \begin{array}{l} d. \quad d. \quad f. \\ 164 \text{ lb. at } 7 : 1 \end{array} \right\}$$

$$27 : - : 8$$

$$12) 20 : 1 : -$$

$$1 : 1 : 4$$

$$1$$

$$Ans. 4.9 : 1 : 1$$

$$\left. \begin{array}{l} d. \quad d. \quad f. \\ 343 \text{ at } 10 : 3 \end{array} \right\}$$

$$57 : - : 4$$

$$3) 85 : 1 : 6$$

$$10 : 1 : 3$$

$$2 : 1$$

$$Ans. 15.3 : 1 : 3 : 1$$

See Example 4, page 62.

Example

Example 34.

d. f.

83 } 428 Yd. of Cloth at 11 : 1

38 } ——— 4

f. 142 : 1 : 4 ss. s. ——— 4

112) 53 : 1 : — 1 : 1 : 9 : — } 28

4 : — : 10 } 7

1 } ———

13 : — : 3 : —

Ans. 20.0 : 1 : 3 187 : 1 : — Prod. by 400. 1875

See Ex. 5, p. 62. 20.0 : 1 : 3 as before. Here the Multiplier being 428, first I multiplied by 28, viz. by 4 and 7, and then by 400.

Example 35.

Example 36.

d. s. d. d. lb. s. d. f.

12/2) 427 Ells at 1 : 1 12/2) 473 at 1 : 1 : 1

112) 213 : 1 d. f. ———

17 : 1 : 6 } 1 : 2/8) 236 : 1

1 } 29 : 1 : 1 : 2

Ans. 23.1 : — : 7

Ans. 26.6 : — : 1 : 2

See Example 6, page 62.

Example

Ans. 2

Example 37.

$$\begin{array}{rcl}
 & & s. \quad d. \quad f. \\
 3 \} & 163 \text{ Gallons at } \underline{\hspace{2cm}} & 1 : 2 : 3 \\
 4 \} & & \underline{\hspace{2cm}} 9 \\
 & 54 : - : 8 & \\
 8) & 40 : 1 : 6 & ss. 5 : 1 : - ; 3 \\
 & 5 : - : 2 : 1 & \underline{\hspace{2cm}} 7 \} 63 \\
 & \underline{\hspace{2cm}} & \\
 n) & 10.0 : - : 4 : 1 & 38 : 1 : 5 : 1 \\
 & \underline{\hspace{2cm}} & 61 : - : 11 : - \text{Pr. by 100.} \\
 & & \\
 \text{Answ.} & 10.0 : - : 4 : 1 & \left| \begin{array}{l} f. \\ 300 \\ \hline 275 \text{ d.} \\ \hline 122 \text{ s. 11 d.} \end{array} \right. \\
 & \underline{\hspace{2cm}} & \\
 & & \text{Product by 100. } 61 : - : 11 \\
 & & \text{ss. s. d.}
 \end{array}$$

Example 38.

$$\begin{array}{rcl}
 & & s. \quad d. \quad f. \\
 2 \} & 35 \text{ Yards at } \underline{\hspace{2cm}} & 1 : 4 : 1 \\
 2 \} & & \underline{\hspace{2cm}} 7 \\
 2 \} & & \\
 & 17 : 1 & \\
 f. & 2 : 1 : 10 & ss. 4 : 1 : 5 : 3 \\
 18) & 2 : 1 : 10 & \underline{\hspace{2cm}} 5 \} 35 \\
 & 6 & \\
 & 2 : 3 \} & \underline{\hspace{2cm}} 2.3 : 1 : 4 : 3 \text{ nf.} \\
 & \underline{\hspace{2cm}} & \\
 \text{Answ.} & 2.3 : 1 : 4 : 3 & \\
 & \underline{\hspace{2cm}} &
 \end{array}$$

Example 42.

s. d.

If I spend 1 : 7 per Day, what is that per Year ?

$$\begin{array}{r}
 365 \text{ Days.} \\
 \hline
 121 : 1 : 4 \\
 121 : 1 : 4 \\
 45 : 1 : 3 \\
 \hline
 \text{Answ. } 28.8 : 1 : 11
 \end{array}$$

$$\begin{array}{r}
 \text{Or thus, by Reduction.} \\
 365 \text{ Pieces of } 19 \text{ d.} \\
 19 \text{ d.} \\
 \hline
 12) 6935 \text{ d.} \\
 \hline
 2) 577 \text{ s. } 11 \text{ d.}
 \end{array}$$

Answ. 28.8 ss. 1 s. 11 d.

Example 43.

$$\begin{array}{r}
 \text{s. d. f.} \\
 340 \text{ lb. at } 1 : 8 : 3 \\
 \hline
 113 : - : 8 \\
 85 : - : - \\
 85 : - : - \\
 10 : 1 : 3 \\
 \hline
 29.3 : 1 : 11
 \end{array}$$

Example 44.

$$\begin{array}{r}
 \text{d.} \\
 8 \overline{) 3} \\
 8 \overline{) 3} \\
 64 \overline{) 3} \\
 \hline
 \text{f.} \\
 3 \overline{) 8} \\
 \hline
 \text{s. d. f.} \\
 216 \text{ at } 1 : 10 : 3 \\
 \hline
 72 \\
 72 \\
 54 \\
 6 : 1 : 6
 \end{array}$$

Answ. 20.4 : 1 : 6
See Example 8, p. 63.

Example

Example 45.

C. $\mathcal{Q}$. lb. s. d.
 5 : 2 : 23 at 2 : 1 per lb.
 5

5
 56 lb. or 2
 23

d. $\frac{2}{12}$ 639 lb. or ss. Product by 1 ss.
 $\frac{1}{2}$ 53 : 6 at 2 d.
 26 : 1 : 3 at 1 d.

66.5 : 1 : 3 Answ.

Here the price of a Pound being given; therefore I reduced the Quantity into Pounds, which I supposed to be the *Product* by 1 ss. and then take parts for it viz. First for 2 d. and half of that for 1 d. which line added to the Quantity or Two-shilling line gives the *Answer*.

Note, As we consider every Unit or thing of which the price is given, to be Two-shillings; therefore there be a Quarter of a Unit in the Quantity, may set down for it 6 d. in the same line with the supposed Two-shillings's, and consequently

For every	{	Quarter	{ If the price of	{	a Yd. Ell, &c.	{ be given, set down
		Nail			a Yd.	
		Ounce			a lb. Avoird.	
		Dram			an Ounce	
		Ounce			a lb. Troy	
		Thing			12, or a Doz.	

And when you have set down for the part of the then work as is directed in the general Rule.

Exa

Example 46.

$$\begin{array}{rcl}
 \text{rd. } \mathcal{Q}. & s. & \\
 157 : 1 \text{ at } 4 & & \\
 ss. & s. & d. \\
 157 : \text{—} : 6 & & \\
 & 2 \text{ ss.} & \\
 \hline
 31.4 : 1 : \text{—} & \text{Answ.} & \\
 \hline
 \end{array}$$

Example 47.

$$\begin{array}{rcl}
 \text{rd. } \mathcal{Q}. & s. & d. \\
 14 : 2 \text{ at } 2 : 8 & & \\
 d. & ss. & s. \\
 8|3) 14 : 1 \text{ Prod. by } 1 \text{ ss.} & & \\
 & 4 : 1 : 4 & \} \\
 & 4 & \\
 \hline
 1.9 : \text{—} : 8 & \text{Answ.} & \\
 \hline
 \end{array}$$

Example 48.

$$\begin{array}{rcl}
 \text{rd. } \mathcal{Q}. & & s. & d. \\
 d. & 18 : 3 \text{ of Cloth at } \text{—} & & 4 : 7 \\
 4|6 \} & ss. & s. & d. \\
 3|8 \} & 18 : 1 : 6 & & 5. & ss. & s. & d. \\
 & 18 : 1 : 6 & & 1|2) 2 : \text{—} : 7 \\
 & 3 : \text{—} : 3 & & & & & 9 \\
 & 2 : \text{—} : 6 & & & & & \hline
 & & 2 : 1 & \} & & 20 : 1 : 3 \\
 & & & & d. & 20 : 1 : 3 \\
 & & & & 6|2) 1 : \text{—} : 3 : 2 \\
 & & & & & 1 : 1 : 3 \\
 \hline
 4.2 : 1 : 11 : 1 & \text{Answ.} & & & & \hline
 & & & & \text{Ans. } 4.2 : 1 : 11 : 1 & \\
 & & & & & \hline
 \end{array}$$

Here instead of multiplying the first line by 2 ss. I set it down twice.

Here instead of multiplying the first line by 18 ss. I multiply by 9, and set the Product down twice.

Example

Example 49.

	lb. oz.		s.	d.
	6	:	7	of Silver at 6 : 2 per oz.
d.	12			
2 12	79 oz.			
	3 ss.			
	237			
	6	:	1	:
	24.3	:	1	:

24.3 : 1 : 2 *Ans.*

Example 50.

	Yd.	N.		s.	d.
	19	:	5	of Stuff at 9 : 4	
d.	8 3		ss.	s.	d.
8 3	19	:	—	:	7
					2
					Here I set down 7 d. 2 f.
				4 ss.	[for 5 N.
	77	:	—	:	6
	6	:	—	:	8
					2 : 2
	6	:	—	:	10
					2

Ans. 9.0 : — : 3 : —

Example

Ps.
9 eachd.
4 | 6*Ans.*

6

Example 51.

Ps.		s.	d.
9 each qt. 25 Yd. at	—	10	: 4 per Yd.
9 Ps.		ss	s. d.
d.		5	: — : 4
4 6) 225 Yd. in all.			5
9 ss.		25	: 1 : 8 } 25
			5
1125			Yd.
37 : 1		129	: — : 4 Price of 25.
			9 Pieces.
Answ. 116.2 : 1			
		116.2	: 1 : — Answ.

Example 52.

	Yd. 2.	s.	d.
6 Pieces each qt. 38 : 3 at	—	11	: 7 per Yd.
6 Ps.		ss	s. d.
		5	: 1 : 7
d. Yd. 232 : 2 2.			
83 } ss. s.			
83 } 232 : 1			
3 8 } 5 ss.			
		1162	: 1
		77	: — : 8 } 4
		77	: 1 : —
		29	: — : 1 : 2
Answ. 134.6 : 1 : 1 : 2			

Example

Example 53.

Doz. *s.* *d.*
 15 and 7 Hats at 12 : 6 per Dozen.
d. *ss.* *s.* *d.*
 6|4) 15 : 1 : 2
 6 *ss.*

93 : 1 : —
 3 : 1 : 6
 3 : 2 }

Answ. 9.7 : — : 9 : 2

Example 54.
Rd. *℥.* *N.*
 45 : 3 : 1 at 14 s.
ss. *s.* *d.* *f.*
 45 : 1 : 7 : 2
 7 *ss.*

Answ. 32.0 : 1 : 4 : 2

In page 124 you are directed to set down 2 d. for every one, if the price of a Dozen be given; consequently for 7 Hats in the Example at 12 s. 6 d. I set down 1 s. 2 d.

Example 55.

s. *d.*
 127 Ells English at 16 : 7 per Ell.
 8) 1270 half ℥.

d. *ss.* *s.* *d.*
 4|6 } 158 *Rd.* 6 half ℥.
 3|8 } 158 : 1 : 6
 8 *ss.*

1270 : — : —
 26 : — : 8
 3
 19 : 1 : 6
 2 : 1 }

Answ. 131.6 : — : 7 : 1

Exam

Practice.

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Example 56.

Example 57.

45. s.
 of Silk at 18 per lb.
 d. f.
 10 : 2
 9 ss.

Doz. l. s. d.
 38 and 5 at 1 : 4 : 6
 d. ss. s. d. [per Doz.
 6) 4) 38 : - : 10
 12 ss.

: 10 : 2 Answ.
 d. f.

461 : - : -
 9 : 1 : 2 : 2

When the price of a lb.
 is 18 pence, you are taught in p.
 to set down 1 d. 2 f. for
 1 Ounce; therefore for
 1 lb. in the Example above,
 set down 10 d. 2 f. and then
 multiply by 9 ss.

47.0 : 1 : 2 : 2 Answ.

Example 58.

Doz. l. s.
 15 and 8 Hats at 1 : 6 per Hat.
 12

188 Hats.
 13 ss.

244.4 Answ.

P

Example

Exam

Example 59.

oz.	dr.					l.	s.	d.	
8	5	at				1	8	6	per oz.
d.	ss.	s.	d.	f.		d.	ss.	s.	d.
6	4	)	8	—	: 7 : 2	6	4	)	14 : — : 6
					7				8 ss.
5	8	:	—	: 4 : 2	d. f.	1	1	4 : — : —	
5	8	:	—	: 4 : 2	1 : 2	4	)	3 : 1 : 1 : 1	
2	:	—	: 1 : 3	$\frac{2}{4}$				1 : 6	
11	8	:	—	: 10 : 3	$\frac{2}{4}$	Ans.			
					Answ. 11.8 : — : 10 :				

Here I multiplied by 7, and
for the Product down twice
for 14.

Example 60.

oz.	dr.					l.	s.	d.	f.
4	1	:	4	at		1	:	14	:
d.	ss.	s.	d.	d.	ss.	s.	d.	f.	
6	4	)	4	1	:	—	: 6	6	4
								17	:
								—	: 7 : 2
								8	
3	3	0	:	—	6	9	2	:	—
d. f.	3	3	0	:	—	4	:	—	: 6
1	:	2	4	)	10	:	—	: 6	
					1	:	2		
					2	:	1	:	1
									: 3
									$\frac{2}{4}$
Ans.	7	1	.	4	:	—	: 3	:	1
									$\frac{2}{4}$

Here I multiplied by 17 ss.
as was taught in page 82.

Product
Ex

Practice.

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Example 61.

Q. N. l. s.
9:1:2 at 1:16

s. d.
9:-:9
6:-:6 } 18 ss.
3

8:1:6 *Answ.*

Example 62.

Chests. C. Q. l. s.
14 each 6:3 at 2:16 per C.

7
47:1 } 14 Chests.
2

C. 94:2 Q. wt. of all.

ss. s.
94:1
7
661:1 } 28 ss.
4

Answ. 264.6:-

Example 63.

Q. l. s. d.
6:3 of Sugar at 2:14:4

ss. s. d.
6) 36:1:6
9
330:1:6 } 27 ss.
3

992:-:6
6:-:3

99.8:-:9 *Answ.*

Exam. 64.

C. Q. lb. l. s. d.
19:1:7 at 6:13:3

s. ss. s. d. f.
1|2) 19:-:7:2
6
115:1:9:- } 66 ss.
11

d. 1274:1:3
3|4) 9:1:3:3
2:-:6

3:3 $\frac{3}{4}$ }

128.6:1:4:2 $\frac{3}{4}$ *Answ.*

Here for 1 Q. 7 lb. I set down 7 d. 2 f. that is 6 d. for 1 Q. and 1 d. 2 f. for 7 lb. it being a 4th part of a Q.

Observe, when the parts of the Unit are such that cannot *set down for such parts as is directed in page 12 then, first find the Value of the Units, and for the part of the Unit, take such parts, of the price as the parts of the Unit, or you may take such a part of a part, what you take for is of that part.

As for instance, if the price of a C. be given, and there be 16 lb. in the Quantity, it being a 7th part of a C. therefore I take a 7th part of the price, and for 4 lb. first work for 1 ℥. of a C. then I take a 7th part of the

But before we proceed, the following Table must be learned perfectly by heart.

The TABLE.

$$\begin{array}{l}
 \text{lb.} \\
 56 \\
 28 \\
 16 \\
 14
 \end{array}
 \left. \vphantom{\begin{array}{l} 56 \\ 28 \\ 16 \\ 14 \end{array}} \right\} \text{ is } \left\{ \begin{array}{l} \text{half} \\ \text{a } \mathcal{L}. \\ \text{a 7th} \\ \text{an 8th} \end{array} \right\} \text{ part } \left\{ \begin{array}{l} \text{of a } \mathcal{L}. \\ \text{C.} \\ \text{wt.} \end{array} \right.$$

$$\begin{array}{l}
 \text{lb.} \\
 14 \\
 7 \\
 4 \\
 3 : 8 \text{ oz.}
 \end{array}
 \left. \vphantom{\begin{array}{l} 14 \\ 7 \\ 4 \\ 3 : 8 \text{ oz.} \end{array}} \right\} \text{ is } \left\{ \begin{array}{l} \text{half} \\ \text{a } \mathcal{L}. \\ \text{a 7th} \\ \text{an 8th} \end{array} \right\} \text{ part } \left\{ \begin{array}{l} \text{of a } \mathcal{L}. \text{ of} \\ \text{a C. wt.} \end{array} \right.$$

The two last Examples work'd thus.

Example

d.
416)

half price
half tha

Ans/w. 9

d.
12 1/2 }
3 1/8 }

℥.
For 1
For 7 lb.

Here
7 lb. I t

Example 65.

<i>C. 2.</i>		<i>l. s. d.</i>
36 : 3 of Sugar at ———		2 : 14 : 4 per C.
<i>d.</i>	<i>ss.</i>	<i>2.</i> <i>ss. s. d.</i>
4(6)	36	2(2) 27 : — : 4
	27 <i>ss.</i>	6
252		163 : — : — } 36
72		6
6		
half price 13 : 1 : 2 for 2 2.		2. 978 : — : —
half that 6 : 1 : 7 for 1 2.		1(2) 13 : 1 : 2
		6 : 1 : 7
<i>Ans.</i> 99.8 : — : 9		
		<i>Ans.</i> 99.8 : — : 9

Example 66.

<i>C. 2. lb.</i>		<i>l. s. d.</i>
19 : 1 : 7 of Tobacco ——— at 6 : 13 : 3		
<i>d.</i>	<i>ss.</i>	<i>2.</i> <i>ss. s. d.</i>
12(2)	19	2(4) 66 : 1 : 3
3(8)	66 <i>ss.</i>	9
		599 : 1 : 3
114		<i>lb.</i> 599 : 1 : 3
114		7(4) 16 : 1 : 3 : 3
9 : 1		4 : — : 3 : 3 $\frac{3}{4}$
2. 2 : — : 9		
For 1 16 : 1 : 3 : 3		<i>Ans.</i> 128.6 : 1 : 4 : 2 $\frac{3}{4}$
For 7 <i>lb.</i> 4 : — : 3 : 3 $\frac{3}{4}$		
		Here I multiplied by
128.6 : 1 : 4 : 2 $\frac{3}{4}$		19, as in page 82.

Here I took a 4th part of the price for 1 2. and for 7 *lb.* I took a 4th part of that.

Example 67.

C. 2. lb.			s.	s.	d.
	17	: 2 : 8 at	1	: 4 : 6	
d.	ss.		2.	ss.	s. d.
6 4)	17		2 2)	12	: - : 6
	12 ss.				8
	204			98	: - : -
	4	: - : 6	lb.	98	: - : -
For 2 2.	6	: - : 3	8 7)	6	: - : 3
For 8 lb.	1	: 9		1	: 9
Ans.	21.5	: - : 6	Ans.	21.5	: - : 6

Here I multiplied by
17, as in page 82:

Observe, if in any of these Examples there be more remainders than one after the Farthings are divided, I shall omit such remainders; and in Decimal Practice I shall shew how to order them.

Example

Practice.

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Example 68.

<i>d.</i>	<i>C. 2. lb.</i>	<i>s. d.</i>
6 4 }	94 : 1 : 11 at ———	18 : 10 per C.
4 6 }	<i>ss.</i>	<i>ss. s. d.</i>
	94	1(4) 9 : — : 10
	9 <i>ss.</i>	94 <i>ss.</i>
	846	<i>lb.</i> 37 : 1 : 4
	23 : 1	847 : 1 : —
	15 : 1 : 4	7 4 }
	2 : — : 8 : 2	4 7 }
For { 12 <i>lb.</i>	1 : 2 : —	2 : — : 6 }
7 <i>lb.</i>	8 : —	2 : 2 }
4		1 : 2
		8
<i>Ans.</i> 88.8 : — : 10 : 2		<i>Ans.</i> 88.8 : — : 10 : 2

d.

60

15 *s.*

Product by 90. 847 *ss.* 1 *s.*

Example 69.

<i>C. 2. lb.</i>	<i>l. s. d.</i>
64 : — : 18 at ———	4 : 13 : 6 per C.
<i>d.</i>	<i>lb.</i>
12 2) 64	16 7) 46 : 1 : 6
46 <i>ss.</i>	8
384	374 : — : —
<i>d.</i> 256	8
6 2) 32	
<i>lb.</i> 16	<i>lb.</i> 2992 : — : —
For { 16 6 : 1 : 4 : 1	2 8) 6 : 1 : 4 : 1
2 1 : 8	— : 1 : 6 }
	2 }
<i>Ans.</i> 299.9 : 1 : — : 1	299.9 : 1 : — : 1 <i>Ans.</i>

Example 72.

C.	Q.	lb.		l.	s.	d.
42	:	1	:	19	of Sugar at	2 : 9 : 4
ss.				Q.	ss.	s. d.
42				1 4)	24 : 8 : 4	
24 ss.					6	
168				148	:-:-	} 42
84				7		
14						
14				lb.		
Q.	6	:	-	:	4	
14 lb.	3	:	-	:	2	
4	-	:	1	:	9	
1				5	:	1
104.6	:	-	:	8	:	1

14	2	}	1036	:	-	
4	7		6	:	-	4
			3	:	-	2
1	4)		-	:	1	9
			5	:	1	
			104.6	:	-	8 : 1

Ans. 104.6 : - : 8 : 1

Example 73.

oz.	pw.		s.	d.
9	:	8	of Silver at	6 : 7 per oz.
ss.				
9				
3 ss.				
27				
1	:	1		
1	:	-	:	3
		1	:	3 : 3
		1	:	3 : 3
3.0	:	1	:	10 : 2

pw.		s.	d.	
4 5	}	6	:	7
4 5		9	ss.	
l.				
2	:	19	:	3
		1	:	3 : 3
		1	:	3 : 3
Ans. l.	3	:	1 : 10 : 2	

Q

Example

Example 78.

Example 79.

lb. l. s. d.
 17 at 3 : 3 : 4 per C.
 ss. s. d.
 8) 31 : 1 : 4

 7) 3 : 1 : 9
 2 }
 2) 1 : 1 : 2
 6 : 3

 4 : 1 : 7 : 1

lb. l. s. d.
 1 at 3 : 12 : 8 per C.
 lb. ss. s. d.
 28 4) 36 : - : 8

 7 4) 9 : - : 2

 1 7) 2 : - : 6 : 2

 Answ. 7 : 3 : 7

Example 80.

of Silk at 18 per lb.
 oz. s.
 4) 18

 2) 4 : 6
 2) 2 : 3
 1 : 1 : 2

 Answ. s. 7 : 10 : 2

Or thus,
 oz. s.
 7 at 18 per lb.
 oz. s. d. f.
 8 2) 18

 1 8) 9 for 8
 1 : 1 : 2 for 1, sub.

 Answ. s. 7 : 10 : 2

See Example 56, page 129.

Abbreviations



Abbreviations in PRACTICE

CASE I.

WHEN either the Price or the Quantity, when reduced into *Two Shillings's*, be an even Number of *Shillings* wanting an even part of *Two Shillings*.

RULE.

First work for the even Number of *Shillings* (that is, the *Two-Shillings's*) as before; then take for the even part which is wanting, and *Subtract* it from the *Product*, for the *Answer*.

Example 1.

d. Yd. s. d.
4|6) 141 — at 1 : 8
Subtract 23 : 1

Ans. 11.7 : 1

Example 2.

d. Yd. s.
2|12) 643 — at 1 : 1
Subtract 53 : 1 : 2

Ans. 58.9 : — : 10

See Example 10, page 64.

In these two Examples with supposing the Quantity to be the *Answer* at *Two-Shillings*, I have no more to do than to work for what is short of *Two-Shillings*, and then *Subtract*.

Example

Example 3.

Yd. 2. N. s. d.

64 : 3 : 2 at 3 : 10 per *Yd.*

ss. s. d.

12) 64 : 1 : 9
2 *ss.*

129 : 1 : 6

5 : - : 8 } *Sub.*
1 : 3

Ans. 12.4 : - : 8 : 1

Here, I first work for 4 *s.*
and then for 2 *d.* and *Subtract*.

Example 4.

d. s. d.
3 | 8) 185 at 7 : 9

4 *ss.* wanting 3 *d.*

740

23 : - : 3 *Sub.*

71.6 : 1 : 9 *Ans.*

Example 5.

lb. oz. pw.

4 : 3 : 10 of Silver — at 5 : 10 per *oz.*

12

s. ss. s. d.

1 | 2) 2 : 1 : 10

51 *oz.*

5 + *ss.*

ss. s. oz. pw.

145 : 1 : 8

12) 51 : 1 for 51 : 10

1 : - : 11

3 *ss.* wanting 2 *d.*

15.0 : - : 5 *Ans.*

154 : 1

4 : - : 6 } *Subtract*
1

d.

20

15.0 : - : 5 *Ans.*

11 *s.* 8 *d.*

Product by 50. 145 *ss.* 1 *s.* 8 *d.*

Example

Example 6.

$$\begin{array}{rcl}
 \text{Yd. N. s. d.} & & \\
 19:5 \text{ at } 9:4 \text{ per Yd.} & & \\
 d. \text{ ss. s. d. f.} & & \\
 8|3) 19:-:7:2 & & \\
 \hline
 & 5 \text{ ss. want-} & \\
 & \text{ing } 8d. & \\
 \hline
 96:1:1:2 & & \\
 6:-:8 & & \\
 2:2 & \left. \begin{array}{l} \\ \\ \end{array} \right\} \text{Sub.} & \\
 \hline
 \end{array}$$

$$9.0:-:3:- \text{ Answ.}$$

See Example 50, page 126.

Example 7.

$$\begin{array}{rcl}
 \text{Yd. N. s. d.} & & \\
 61:7 \text{ at } 15:4 \text{ per Yd.} & & \\
 d. \text{ ss. s. d. f.} & & \\
 8|3) 61:-:10:2 & & \\
 \hline
 & 8 \text{ ss. want-} & \\
 & \text{ing } 8d. & \\
 \hline
 491:1:-:- & & \\
 20:-:8 & & \\
 3:2 & \left. \begin{array}{l} \\ \\ \end{array} \right\} \text{Sub.} & \\
 \hline
 \end{array}$$

$$47.1:-:-:2 \text{ Answ.}$$

Example 8.

$$\begin{array}{rcl}
 \text{lb. oz.} & & \text{s. d.} \\
 15:12 \text{ at } 11:8 \text{ per lb;} & & \\
 d. \text{ ss. s. d.} & & d. \text{ ss. s. d.} \\
 4|6) 15:1:6 & & 6|4) 5:1:8 \\
 \hline
 & 6 \text{ ss. want-} & \\
 & \text{ing } 4d. & \\
 \hline
 94:1:- & & \\
 2:1:3 \text{ Sub.} & & \\
 \hline
 \end{array}$$

$$9.1:1:9 \text{ Answ.}$$

$$\begin{array}{rcl}
 & 4 & \\
 & \left. \begin{array}{l} \\ \\ \end{array} \right\} \text{ss.} & \\
 23:-:8 & & \\
 4 & \left. \begin{array}{l} \\ \\ \end{array} \right\} \text{16 want-} & \\
 & \text{ing } 6d. & \\
 \hline
 \end{array}$$

$$\begin{array}{rcl}
 93:-:8 & & \\
 1:-:6 & & \\
 5 & \left. \begin{array}{l} \\ \\ \end{array} \right\} \text{Sub.} & \\
 \hline
 \end{array}$$

$$\text{Answ. } 9.1:1:9$$

Example

Example 9.

Example 10.

Pieces. l. s. d.	C. 2. l. s. d.
8) 416 at 1 : 17 : 9	345 : 3 at 2 : 19 : 10 per C.
19 ss. want-	d. ss. s. d.
— ing 3d.	2 12) 345 : 1 : 6
7904	30 ss. wanting 2d.
52 Sub.	
785.2 Answ.	10372 : 1 : — d.
	28 : 1 : 6
	1 : 2 } 60
	05 s.
Answ. 1034.3 : 1 : 4 : 2	10372 ss. 1s.
	Prod by 30.

When the Price is 2 s. wanting a part of some even
part; work as follows.

Example 1.

Example 2.

Yd. s. d.	Ells s. d. f.
164 at 1 : 11	362 at 1 : 10 : 2
ss.	d. f. ss.
8) 164	3 8) 362
3) 20 : 1	2) 45 : 6
Sub. 6 : 1 : 4 } at 1	Sub. 22 : 1 : 3
4	
Ans. 15.7 : — : 4	33.9 : — : 9 Answ.

The first Example explain'd. The Quantity being the
answer at 2 s. I then work for 1 d. viz. First for 3 d.
and take a third of that for 1 d. then this line at 1 d.
abstracted from the line at 2 s. gives the Answer.

When

When the price is 3 *d.* or 2 *d.* wanting a part, work thus ;

Example 1.

$$\begin{array}{rcl}
 d. & \text{Ells} & d. \quad f. \\
 3 & | 8) & 416 \text{ at } 2 : 3 \\
 f. & & \hline
 1 & | & 12) 52 \quad \text{at } 3 d. \\
 & & \text{Sub. } 4 : - : 8 \text{ at } 1 f.
 \end{array}$$

Ans. 4 : 7 : 1 : 4

Example 2.

$$\begin{array}{rcl}
 d. & lb. & d. \quad f. \\
 2 & | 12) & 312 \text{ at } 1 : 3 \\
 f. & & \hline
 1 & | 8) & 26 \\
 & & 3 : - : 6
 \end{array}$$

Ans. 2 : 2 : 1 : 6

See *Example 2*, page 61.

CASE 2.

When you gain so much *per Shilling*, to know what you gain by laying out any number of Pounds.

RULE.

First consider what you gain by *Two-Shillings*; then see what you gain by the *Two-shillings's* in the number of Pounds laid out:

Example 1.

If I gain 1 *d.* 2 *f.* *per Shilling*, what is that *per Cent*, or *l.* 100 ?

Here I gain 3 *d.* by 2 *s.* and there being 1000 *ss.* in 100 *l.* therefore the Question stands thus :

$$\begin{array}{rcl}
 d. & ss. & \\
 3 & | 8) & 1000 \text{ at } 3 d.
 \end{array}$$

12.5 *Answer.*

Example

Example 2.

Example 3.

3 d. 2 f. per Shilling,
what per l. ?
l. ss. d.

In 1 are 10 at 7
10

s. 5 : 10 Answ.

At 3 d. 3 f. per Shilling,
what shall I gain in laying
out 5 l. ?

ss. d. f.
50 at 7 : 2
50

f.
20

15 d.

Answ. { 11 s. 3 d.
1 l.

Example 4.

Example 5.

d. f.
4 : 2 per Shilling,
per Cent ?

ss. d.

1000 at 9

3

3000 Three pences.

37.5 ss.

d.
At 7 per Shilling,
what per Cent ?

ss. s. d.

1000 at 1 : 2

7

12) 7000 Two-pences.

Answ. 58.3 ss. — s. 8 d.

R

Example

Example 6.

d. f.
If I gain 9 : 1 per Shilling, what is that per C

<i>s. d. f.</i>	<i>s. d. f.</i>	
<i>s. 1</i> 2) 1000 <i>ss.</i>	_____ at 1 : 6 : 2	
	1000 <i>ss.</i>	
<i>d. 6</i> 2) 500		_____
<i>f. 2</i> 12) 250		<i>f.</i>
	20 : 1 : 8	2000
	_____	_____
<i>Answ.</i> 77.0 : 1 : 8		6500 <i>d.</i>

		1541 <i>s.</i>

Answ. 77.0 : 1 : 8
ss.

C A S E 3.

It may often happen that by inverting your Question (that is, by calling the price the Quantity, and Quantity the price) the work may be performed

R U L E.

Call the price in pence the Quantity, and Quantity the price in pence; but take care that Quantity be of the same Denomination with the U then work as has been taught.

Example 1.

What will 12 Yards come to, at 3 *d.* per Yd. Or Inverted as per Rule, you have the Answer eight, viz. 3 Yards at 12 *d.* per Yd.

Exam

Example 2.

Yd. d.	Yd. d.	s. d.
18 at 5 per Yard ; or,	5 at 18 or	1 : 6
	5	
	s. 7 : 6	<i>Ans.</i>

Example 3.

Ells d.	Ells d.	s. d.
21 at 7 per Ell ; or,	7 at 21 or	1 : 9
	7	
	Answer s. 12 : 3	

Example 4.

d.	d.	s. d.
9 Weeks at 9 per Week ; or,	9 Weeks at	25 or 2 : 1
	9	
	Answer s. 18 : 9	

Example 5.

d.	d.	s.
11 Ells at 11 per Ell ; or,	11 Ells at	36 or 3
	11	
	Answer l. 1 : 13	

It will not always be convenient to Invert Question, but only where it may contribute to ready answering it : as for instance, 19 Yards at per Yd. is 19 Six-pences, or 9 s. 6 d. This, and like Examples stand best as they are.

Observe,

Observe, - in Inverting your Question, when the is a part of a *Yard*, *lb.* &c. call it such a part of a Penny, and the Farthings call such a part of a *Yard*, *lb.* &c. as they are of a Penny.

Example 6.

d. f. *Yd. 2.* *d.*
12 Yards at 9 : 3 per *Yd.* or, 9 : 3 at 12

s. d.
Here the *Answer* is 9 : 9, and is easily known without any operation.

Example 7.

Yd. 2. d. *Yd. d. f. s. d.*
27 : 2 at 10 per *Yd.*; or, 10 at 27 : 2 or 2 : 3:

Answer l. 1 : 2 : 11:

Example 8.

lb. 2. d. *lb. d. f. s. d.*
29 : 1 at 11 per *lb.*; or, 11 at 29 : 1 or 2 : 5:

Answer l. 1 . 6 : 9:

Exa

Example 9.

Yd. Q. d. f. *Yd. Q. d. f. s. d. f.*
 32 : 3 at 7 : 1 per *Yd.* or, 7 : 1 at 32 : 3 or 2 : 8 : 3

7

For 1 *Q.* a 4th of the price $\frac{19 : 1 : 1}{8 : - \frac{3}{4}}$

Answer s. $\frac{19 : 9 : 1}{- \frac{3}{4}}$

Example 10.

lb. d. f. *lb. Q. d. s.*
 48 at 9 : 1 ; or, 9 : 1 at 48 or 4
ss. s. d. lb. Q.
 9 : - : 6 for 9 : 1
 2 *ss.*

Answer $\frac{1.8 : 1 : -}{-}$

Example 11.

lb. d. f. *lb. Q. d. s.*
 72 at 20 : 3 ; or, 20 : 3 at 72 or 6
ss. s. d.
 20 : 1 : 6
 3 *ss.*

Answer $\frac{6.2 : - : 6}{-}$

Example

Example 12.

$$\begin{array}{rcl}
 \text{rd. } 2. & d. & \\
 114 : 2 & \text{at } 5; \text{ or, } \&c. & \\
 & d. & f. & s. & d. & f. \\
 114 : 2 & \text{is } 9 : 6 : 2 & & & & \\
 & & & & & 5 \text{ lb.}
 \end{array}$$

Answer l. 2 : 7 : 8 : 2

Example 13.

$$\begin{array}{rcl}
 2. & \text{lb.} & d. \\
 2 : 16 & \text{of Sugar at } 7 \text{ per lb. or, } \&c. & \\
 \text{Here } 2 & 2. & 16 \text{ lb. being reduced into Pounds and} \\
 \text{reckoned as Pence is } 72 & d. & \text{or } 6 \text{ s.} \\
 & & 7 \text{ lb.}
 \end{array}$$

Answer l. 2 : 2

Example 14.

$$\begin{array}{rcl}
 C. & d. & \text{lb.} & d. & s. & d. \\
 1 & \text{of Sugar at } 4 \text{ per lb. or, } 4 & \text{at } 112 & \text{or } 9 : 4 & & \\
 & & & & & 4
 \end{array}$$

Answer l. 1 : 17 : 4

Example 15.

$$\begin{array}{rcl}
 C. & d. & \\
 1 & \text{at } 10 \text{ per lb.} & \\
 & s. & d. \\
 & 9 : 4 & \\
 & 10 &
 \end{array}$$

Answer l. 4 : 13 : 4

GOLDEN



GOLDEN RULE.

THIS Rule is so named for its excellency and usefulness ; and is called the *Rule of Three*, because there are three Numbers given : It is also called the *Rule of Proportion*, because by working with these three Numbers we find a fourth in Proportion to them ; that is, which has the same Proportion to one of the three given Numbers, as another of them has to the remaining one.

R U L E.

The three Numbers are to be set down in one line (which is called *stating the Question*) thus : place that Number, which is of the same kind that the Answer is to be of, in the second place ; and that Number which depends upon (or, which is connected with, or relates to, or produces) this second Number, in the first place ; and the other Number in the third place ; and call those Numbers, which stand in the first and third places, *Extremes*.

The Question being thus stated, you must always multiply the second Number and one of the *Extremes* together : if the Answer to the Question is to be greater than the second Number ; then the greater,
Extreme

Extreme and second Number are to be multiplied together; but if lesser, the lesser Extreme and second Number; and that Product will be of the the same name or names with the second Number, and must be divided by the other Extreme, and the Quotient will be the Answer to the Question, in the same name with the Product before mentioned.

Observe, before you work with the Extremes, that they both be reduced into the same Denomination, if they are not already so.

Example 1.

If I give 1 *l.* 16 *s.* for 4 Yards of Cloth, what must I give for 14 Yards?

Yd. *ss.* *Yd.*
If 4 cost 18, what will 14 cost?

$$\begin{array}{r} 14 \\ \hline 4 \overline{) 252} \text{ ss.} \end{array}$$

Answer 6.3

In this *Example*, 14 Yards will cost more than 1 *l.* 16 *s.* which is but the price of 4 Yards; therefore as *per Rule*, I multiply the second Number by 14 the greater Extreme, and that Product I divide by 4 the lesser Extreme for the Answer.

Example

Golden Rule.

353

Example 2.

6 Pieces of Fustian cost 5 l. 12 s. what will 64 cost ?

Ps. ss. Ps.
If 6 cost 56, what 64 ?

8

448

8

6) 3584 ss.

Answer 59.7 ss. — s. 8 d.

Example 3.

I give 14 s. for 12 Ells of Check, what must I
for 75 Ells.

Ells

Ells

If 12 cost 7 ss. what 75 ?

7 ss.

12) 525 ss.

Answer 4.3 ss. 1 s. 6 d.

S

Example

Example 4.

What must I give for 256 Yards of Broad Cloth
if I give 6 *l.* 14 *s.* for 16 Yards?

Yd. *ss.* *Yd.*
If 16 cost 67, what 256?

1792
1536

4) 17152 *ss.*

4) 4288

Answer 107.2 *ss.*

Example 5.

C. *C.*
If 48 of Sugar cost 145 *l.* 13 *s.* what will 5 cost?

C. *ss.* *s.* *C.*
If 48 cost 1456 : 1, what 5?

5 *C.*

6) 7282 : 1

8) 1213 : 1 : 4 }
2 }

Answer 15.1 : 1 : 3 }
2 : 1 }

Example

Golden Rule.

155

Example 6.

What will 8 Ells of Holland come to, if 69 Ells cost 241 $l.$ 3 $s.$?

$$\begin{array}{cccc} \text{Ells} & \text{ss.} & \text{s.} & \text{Ells.} \\ \text{If 69 cost 241 : 1, what 8?} & & & \end{array}$$

69) 1932 : — (2.8 ss. Answer.

552

..

Example 7.

Gallons of Wine cost 1 $l.$ 9 $s.$ 5 $d.$ what will 800 cost?

$$\begin{array}{ccccccc} \text{G.} & \text{ss.} & \text{s.} & \text{d.} & & \text{G.} & \\ \text{If 6 cost 14 : 1 : 5, what 800?} & & & & & & \end{array}$$

d.

400

133 $s.$ 4 $d.$

6) 11766 $ss.$ 1 $s.$ 4 $d.$

Answer 196.1 : — : 2 : 2 $\frac{4}{6}$

Example

Example 8.

If 27 lb. of Galls cost 1 l. 3 s. 7 d. what
I give for 10 C. 2 Q. 24 lb.?

lb. ss. s. d. C. Q. lb.
If 27 cost 11 : 1 : 7, ——— what 10 : 2 : 24

1200	10
s.	10
100	56
3) 14150 ss.	24
9) 4716 : 1 : 4	1200 lb.

Answer 52.4 : — : 1 : 3 $\frac{1}{2}$

Example 9.

If 8 Pieces come to 16 l. 13 s. 10 d. what
38 Pieces come to?

Ps. ss. s. d. Ps.

If 8 come to 166 : 1 : 10, ——— what 38?

38	d.
1335 : — : 8	60
5007 : 1	15 s.
8) 6342 : 1 : 8	5007 ss. 1

Answer 79.2 : 1 : 6 }
2 : 2 }

Product by 3

Exam

Example 10.

If 12 Yards cost 4 *l.* 12 *s.* 4 *d.* what must I give for 127 Yards?

<i>Yd.</i>	<i>ss.</i>	<i>s.</i>	<i>d.</i>	<i>Yd.</i>
If 12 cost	46	:	—	: 4, what 127?
	6			

277 Groats.
~~127~~ *Yd.*
 1939
 554

1st number 12) 35179 Groats.

6) 2931 *G.* 2 *d.* 1 *f.* $\frac{4}{12}$

Answer 48.8 *ss.* 15. 2*d.* 1*f.* $\frac{4}{12}$

In the last Question, first I reduced the second Number into one Denomination; then multiplied and divided by the Extremes, the same may be done in any other Question.

Example

Example 11.

What is the Price of 46 Yards of Cambrick, if I give 4 *l.* 17 *s.* 3 *d.* for 19 Yards?

Yd. *ss.* *s.* *d.* *Yd.*
If 19 cost 48 : 1 : 3, what 46?

9 }
437 : 1 : 3 } 45, and top line
5 } taken in by 5.

19) 2236 : 1 : 6 (11:7 *ss.*

—
• 33 *l.* *s.* *d.* *f.* $\frac{2}{19}$
Answer 11 : 15 : 5 : 1 $\frac{2}{19}$

—
146

—
13 *ss.*

2

—
27 *s.*

12

19) 330 *d.* (17 *d.*

—
140

—
• 7 *d.*

4

19) 28 *f.* (1 *f.*

—
• 9

Or thus,

Golden Rule.

159

Or thus,

Yd. *ss.* *s.* *d.* *Yd.*
If 19 cost 48 : 4 : 3, what 46?
8

389 Three-pences.
46 *Yd.*

2334
1556

8)

19) 3-pences 17894 (941 Three-pences.

• 79

11.7:1:3

2:1 2
19

} Answer.

• 34

3-pences 15 Rem.
12 f.

19) 180 f. (9 f. or 2 d. 1 f.

• 9 Rem.

Example

Golden Rule.**Example 12.**

What must I give for 325 Yards of Holland, if I give 1 *l.* 17 *s.* 5 *d.* for 6 Yards?

Yd. *ss.* *s.* *d.* *Yd.*
If 6 cost 18 : 1 : 5, what 325?

$$\begin{array}{r}
 \begin{array}{r}
 \hline
 5 \\
 \hline
 93 : 1 : 1 \\
 \hline
 5
 \end{array}
 \left. \vphantom{\begin{array}{r} 5 \\ 93 : 1 : 1 \\ 5 \end{array}} \right\} 25 \\
 \hline
 \text{Prod. by } \left\{ \begin{array}{l} 25 \\ 300 \end{array} \right. \begin{array}{r} 467 : 1 : 5 \\ 5612 : 1 \end{array} \\
 \hline
 6) 6080 : - : 5 \\
 \hline
 \text{Answer } 101.3 : - : 8 : 3 \frac{2}{6}
 \end{array}$$

d.
 300
 025 *s.*
 5612 *ss.* 1 *s.*
 Prod. by 300

Or thus,

Yd. *ss.* *s.* *d.* *Yd.*
If 6 cost 18 : 1 : 5, what 325?

$$\begin{array}{r}
 2 \\
 \hline
 37 \text{ s.} \\
 12 \\
 \hline
 449 \text{ d.} \\
 325 \\
 \hline
 2245 \\
 898 \\
 \hline
 1347 \\
 \hline
 \text{1st number 6) } 145925 \text{ d.} \\
 \hline
 12) 24320 \text{ d. } 3 \text{ f. } \frac{2}{6} \\
 \hline
 2) 2026 \text{ s. } 8 \text{ d.} \\
 \hline
 \text{Answer } 101.3 \text{ ss. } - \text{ s. } 8 \text{ d. } 3 \text{ f. } \frac{2}{6}
 \end{array}$$

Example 13.

If I give 4*l.* 18*s.* for 18 Yards of Check, what
 If I give for 640 Ells English?

Yd. *ss.* 8)

If 18 cost 49, what 6400 half 2.

800 800 Yards.

6) 39200 *ss.*

3) 6533 : — : 8

Answer 217.7 : 1 : 4

2 : 2 $\frac{2}{3}$ }

Here the Ex-
 tremes being of
 different names,
 I fix a Cypher to
 the *Ells* to bring
 them into half
 2. and then re-
 duce them into
 [Yards.]

Example 14.

3 Nails of Cloth be worth 3 *s.* 7 *d.* what is the
 of 5 Yards?

ss. *s.* *d.* *Yd.*
 be worth 1 : 1 : 7, what 5?

80 16

d. 80 *N.*

80

06 *s.* 8 *d.*

N. 3) 143 *ss.* — *s.* 8 *d.* Prod. by 80.

4.7 : 1 : 4

2 : 2 $\frac{2}{3}$ } Answer.

T

Example

Example 15.

If 15 lb. of Galls cost 16 s. what will 2 lb. 8 oz. cost?

lb.	ss.	lb. oz.
If 15 cost	8, what	2 : 8 ?
<u>2</u>	<u>5</u>	<u>2</u>
half lb. 30	3 0 4 0 ss.	5 halt lb.

Answer 1 ss. — s. 8 d.

Here, when I have cut off the Cyphers which are in the Divisor and Dividend, I have only 4 to be divided by 3, which gives 2 s. 8 d. for the Answer.

Example 16.

If I give 90 l. 10 s. for 17 C. 2 Q. what must I give for 1 C. ?

C.	Q.	ss.	Q.
If 17 : 2 cost	905, what	4 ?	
<u>4</u>	<u>4 Q.</u>		
Q. 70	7 0 362 0 ss.		

Answer 5.1 : 1 : 5 $\frac{3}{7}$

Examp

If a
yeth
xpenc

First
tracting
hus,

Su

If

If I pay
Q. 11

C.

If 12 :

17

17

17

84

11

1992 lb

Example 17.

If a Gentleman worth 419 l. 3 s. 9 d. per Annum
layeth up at the Years end 150 l. what are his
expences daily?

First find what he expends in the Year, by Sub-
tracting what he layeth up out of his Yearly income,

thus, l. s. d.
419 : 3 : 9
Sub. 150

269 : 3 : 9 his Yearly expences; then say
Days s. s. d. Day.

If in 365 I spend 2691 : 1 : 9, what 1?

8
3-pences. 8)
365) 21535 (59 Three-pences.
3285 7 ss. — s. 9 d. Ansf.
...

Example 18.

If I pay 6 l. 4 s. 11 d. 1 f. for the Carriage of 17 C.
2 11 lb. what is that per lb.?

C. 2 lb. ss. s. d. f. lb.
If 17 : 3 : 11 require 6e : — : 11 : 1, what 1?

17 12
17 —
17 749 dd.
84 8
11 —
1999) 5997 f. (3 f. Answer.
1997 lb.
....

Example

Example 19.

How many Gallons of Wine at 6 s. per Gallon may I have for 50 l.?

ss. Gal. ss.
If 3 require 1, what 500?
3) 500 Gal.

Answer 166 : 2 : 1 $\frac{1}{3}$
gal. qrt. pt. 3

Here when the 500 ss. are multiplied by 1 Gal. the second number, they become Gallons, as per Rule.

Example 20.

How many Yards of Cloth at 4 s. 9 d. per Yard may I have for 16 l. 18 s.?

s. d. Yd. ss.
If 4 : 9 require 1, what 169?
4 8

3-pences 19

3-pences.
19) 1352 (71 Yd.

Yd. N. $\frac{10}{19}$ N.
Answer 71 : 2 $\frac{10}{19}$

22
3 Yd. Rem.
16 N.

19) 48 N. (2 N.
10 Rem.

Here the above 1352 three-pences, when multiplied by 1 Yd. the second Number, become Yards.

Example

How
may I

s.
If 5 :

3
16

What
ave for

d. f.
4 : 2-re
2

9 Half

ist n

C.

Answer 32 :

Example 21.

How many Yards of Cloth at 5 s. 4 d. per Ell,
may I have for 86 l. 13 s. 4 d.?

s. d. Ell ss. s. d.
If 5 : 4 require 1, what 866 : 1 : 4 ?
3 6

16 Groats.

G. 16 { 4) 5200 Groats, which being
 — multiplied by the 2d
 4) 1300 number 1 Ell makes
 — them Ells.

8) 3250 Here I fix a Cypher,
 — which reduces the

Answer 406 : 1 325 Ells into
Yd. 2. half 2.

Example 22.

d. f.
What Quantity of Sugar at 4 : 2 per lb. may I
have for 68 l. 8 s. ?

d. f. lb. ss.
4 : 2 require 1, what 684 ?
2 12

9 Half-pence. 8208 d.
 4

1st number 9) 32832 Half-pence; but when
 — multiplied by 1 lb. the
112) 3648 lb. (32 C. | 2d number
 they are lb.

• 288

C. 2 lb. Rem. 64 lb. or 2 2. 8 lb.

Example

32 : 2 : 8

Example 23.

How many Weeks shall I be in laying up 1000, I put by 8 s. 5 d. per Week?

s.	d.	Wk.	ss.
If 8 : 5 require 1, what 1000 ?			
12			24 d.
101 d.			
		101)	24000 d. (237 Weeks
			• 380
			• 770
		Rem.	• 63 Week.
			7
		101)	441 days (4 days
		Rem.	37

W. D.
Answer $237 : 4 \frac{37}{101}$

Observe, in this Rule we say there are always three Numbers given to find a fourth; that is, there are only three Numbers, which we must make use of, tho' sometimes there may be four Numbers given, but by taking care in stating the Question, that the Extremes be of a like kind, you may easily perceive which is the Superfluous Number; besides, the Number is always known by being twice mentioned or referred to.

Exam

Example 24.

What must I give to have 35 C. carried 104 Miles,
I give 1 l. 17 s. 9 d. to have 6 C. carried the
same way?

C. ss. s. d. C.
If 6 require 18 : 1 : 9, what 35?

$$\begin{array}{r} \hline 7 \\ 132 : - : 3 \end{array} \left. \vphantom{\begin{array}{r} 7 \\ 132 : - : 3 \end{array}} \right\} 35 C.$$

$$\hline 6) 660 : 1 : 3$$

Answer 11.0 : - : 2 : 2

Here the Superfluous Number is 104 Miles.

In the foregoing Examples the second and third Numbers were multiplied together: But in the following Examples if you consider, as *per* Rule, which of the Extremes and second Number are to be multiplied together; you will easily perceive that you are to multiply the first Extreme, and second Number together; for in the next Example the *Answer* is to be less than the second Number; for 50 Men will do the Work sooner than 30 Men; therefore the second Number and least Extreme (or first Number) are multiplied together.

Example

*Golden Rate.**Example 25.*

If 30 Men can do a Piece of Work in 45 Days,
in how many Days will 50 Men do the same Work?

M. *D.* *M.*
If 30 are 45, how 50?

50) 1350 Days.

Answer 27 Days.

Here one Piece of work is the Superfluous Number.

Example 26.

If 100 *l.* gain 5 *l.* Interest in 12 Months; what
Principal will gain as much in 7 Months?

M. *ss.* *M.*
If 12 ——— 1000 ——— 7

12
7) 12000 *ss.*

Answer 171.4 *ss.* — s. 6 d. 3f. $\frac{3}{7}$

Here 5 *l.* is the Superfluous Number.

Example

Example 27.

How many Yards of Matting that is 2 Feet broad,
cover a Floor that is 6 Yd. 2 Q. long and 5
broad?

Yd.	Yd. Q.	F.
If 5	6	2
<u>3</u>	<u>5</u>	<u>2</u>
F. 15	32 : 2	15 F.
	3	

$$2) 97 : 2$$

$$48 : 3 \text{ Answer}$$

$$\text{Yd. Q.}$$

Or thus,

Yd.	Yd. Q.	F.
If 5	6	2
<u>3</u>	<u>2</u>	<u>2</u>
F. 15	13 half Yd.	15

3d Number 2) 195 half Yd.

$$2) 97 \text{ half Yd. } 1 \text{ Q.}$$

$$\text{Answer } 48 : 3$$

$$\text{Yd. Q.}$$

U

Example

Example 28.

How much Shalloon that is 3 $\mathcal{Q}$. broad, will
sufficient to line a Suit of Clothes of Broad Cloth
which hath in it 3 Yd. 3 $\mathcal{Q}$. of 1 Yd. 3 $\mathcal{Q}$. 1 N. broad

Yd.	$\mathcal{Q}$.	N.	Yd.	$\mathcal{Q}$.	$\mathcal{Q}$.
If 1 :	3 :	1 —	3 :	3 —	3
4			7		4
7 $\mathcal{Q}$.			26 : 1	28,	12 N.
4			4	and top line taken in by	
29			12) 108 : 3		

Answer 9 : - : 1
Yd. $\mathcal{Q}$. N.

Example 29.

How much Paper that is 2 Feet 9 Inches broad
will hang a Wall that is 15 F. 7 Inch. long, and
6 Inch. high?

F.	I.	F.	I.	F.	I.
If 8 :	6 —	15 :	7 —	2 :	9
4		11		4	
3-Inches 34		171 : 5	33,	11 three In	
		3	and top line taken		
		11) 529 : 10			

Answer 48 : 2
Feet. Inches.

Abbreviat

BREVIATION in the GOLDEN RULE.

R U L E.

STATE the Question and reduce the Extremes, so as to be of a like Denomination, as usual; and the Divisor can be equally divided by any figure, so either of the other two Numbers can be equally divided by the same figure; then work with those Numbers and you will have the *Answer*.

Example 1.

6 Yards of Cloth cost 5 l. 6 s. what will 42 Yd.

$$\begin{array}{r}
 6) \quad \quad \quad ss. \quad \quad \quad 6) \\
 \text{If } 6 \text{ Yd. cost } 53, \text{ what } 42 \text{ Yd. ?} \\
 \hline
 \quad \quad \quad 7 \quad \quad \quad \hline
 1 \quad \quad \quad 7 \\
 \text{Answer } 37.1
 \end{array}$$

I divided the Divisor by 6, and the Quotient and also the third Number by 6, and the Quotient then I multiplied the second Number by 7 instead of 42, and divided by 1 instead of 6.

Example 2.

5 of Galls cost 16, what will 2 : 8 cost?

$$\begin{array}{r}
 lb. \quad \quad \quad 6) \quad \quad \quad lb. \quad oz. \\
 \text{If } 15 \text{ cost } 8 \text{ ss. what } 2 : 8? \\
 \hline
 2 \quad \quad \quad 2 \\
 \text{Answer } 1 \text{ ss. } -s. 8d. \\
 5) 30 \text{ half lb.} \quad \quad \quad 5) 5 \text{ half lb.} \\
 \hline
 6 \quad \quad \quad 1
 \end{array}$$

I divide the first and third Numbers by 5, which the Divisor 6 and the multiplier 1, therefore the 8 ss. by 6 gives the *Answ*. See Ex. 15 p. 162.

Example

Example 3.

If I give 3 l. 15 s. 6 d. for 7 Yards of Cloth, must I give for 84 Yards?

$$\begin{array}{rcl}
 7) & \text{ss. s. d.} & 7) \\
 \text{If } 7 \text{ Yd. cost } 37 : 1 : 6, & \text{what } 84 \text{ Yd.} & \\
 \hline & 12 & \hline
 \end{array}$$

1 12

Answer 45.3 : — : —

Example 4.

What must I give for 157 Ells of Cloth, if I 8 l. 2 s. for 9 Ells?

$$\begin{array}{rcl}
 9) & 9) & \\
 \text{If } 9 \text{ Ells cost } 81 \text{ ss.} & \text{what } 157 \text{ Ells?} & \\
 \hline & 9 \text{ ss.} & \\
 \hline & 141.3 \text{ ss.} & \text{Answer}
 \end{array}$$

Example 5.

If 24 Dozen of Hats cost 62 l. 2 s. what must I give for 456 Dozen?

$$\begin{array}{rcl}
 6) & 6) & \\
 \text{If } 24 \text{ Dozen cost } 621 \text{ ss.} & \text{what } 456 \text{ Dozen?} & \\
 \hline & 19 & \hline
 4) 4 & & 4) 76 \\
 \hline & \text{Answ. } 1179.9 \text{ ss.} & \hline
 \hline & & 19
 \end{array}$$

Here I divide the Divisor by 6, and also the Number; and then those Quotients equally again.

Exa

What
45 l. 10

Here
the Quo
number
with the

If 25
must I g

6)

If 25

2) 4

2

If wh
the Penn
Penny L
If 6 s.

4

3) 27

9

Golden Rule.

173

Example 6.

What must I give for 3 Yards of Muslin, if I give 45 l. 10 s. for 168 Yards?

If 168 Yd. cost 455 ss. what 3 Yd.?

$$\begin{array}{r} 7 \overline{) 455} \\ 7 \overline{) 168} \\ 3 \overline{) 1} \end{array}$$

$$\begin{array}{r} 3 \overline{) 24} \\ 8 \overline{) 65} \end{array}$$

8 ss. — s. 3 d. Answer.

Here I divide the first and second numbers by 7, then the Quotient of the first number being 24, and the third number 3, I divide both those by 3, and then work with the Quotients for the Answer.

Example 7.

If 252 Pieces of Check cost 98 l. 17 s. 6 d. what must I give for 24 Pieces?

If 252 Ps. cost 988 : 1 : 6, what 24 Ps.?

$$\begin{array}{r} 6 \overline{) 988} \\ 2 \overline{) 4} \\ 2 \overline{) 42} \\ 3 \overline{) 1977} \\ 7 \overline{) 659} \end{array}$$

Answer 9.4 : — : 4

Example 8.

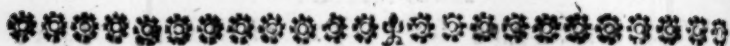
If when the Bushel of Wheat is sold for 6 s. 9 d. the Penny Loaf weighs 11 oz. 6 pw. what must the Penny Loaf weigh, when the Bushel is sold for 10 s. 6 d.?

If 6 s. 9 d. — 11 oz. 6 pw. — 10 s. 6 d.

$$\begin{array}{r} 4 \overline{) 108} \\ 9 \overline{) 110} \\ 4 \overline{) 42} \end{array}$$

$$\begin{array}{r} 3 \overline{) 27} \\ 2 \overline{) 101} \\ 7 \overline{) 50} \end{array}$$

Answer 7 : 5 : 6 $\frac{6}{7}$ oz. pw. gr. Another



Another method of Working the GOLDEN RULE.

WHEN the Question is stated as usual, and the second Number is the price or value of the first Number.

R U L E.

See that the first Number and the highest Denomination in the third Number, be of a like name then suppose the second Number to be the value or price of one, and find what the third Number will come to at that price, as was Taught in *Practice*; then divide that *Answer* by the first Number, and you will have the *Answer* to the *Question*.

Example 1.

What must I give for 345 Yards of Cloth, if I give 2 *l.* 18 *s.* 3 *d.* for 7 Yards?

d.
3 | 8)

Yd. ss. s. d. 3 | 8)
If 7 cost 29 : -- : 3, what 345 Yards?

29

3105

690

43 : -- : 3

7) 10048 : -- : 3

Answer 143.5 : -- : 10 : 2 ⁶/₇

Here according to the Rule, I find what 345 Yards will come to, at 2 *l.* 18 *s.* 3 *d.* which I divide by the first Number 7 for the *Answer*.

Example

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If 6

See

This o
ommon

Example 2. d.

rd. l. s. d. $\begin{array}{r|l} 8 & 3 \\ 8 & 3 \end{array}$

If 6 cost 1 : 17 : 5, what cost 325 Yards?

$\frac{18}{100}$ ss.

2600

d. 108 : — : 8

1 | 8) 108 : — : 8

13 : 1 : 1

6) 6080 : — : 5

Answer 101.3. — : 8 : 3 $\frac{2}{5}$

See Example 12, page 160.

Example 3.

rd. s. d. rd. Q. N.
If 5 cost 18 : 8, what 52 : 2 : 2 ?

d. ss. s. d.

8 | 5) 52 : 1 : 3

9 ss.

473 : 1 : 3

17 : — : 8

5 }

5) 491 : — : 4

Answer 9.8 : — : 5 : 2 $\frac{2}{5}$

This operation is about 40 figures shorter than the common method.

Example

Example 4.

If 18 Yards cost 6 l. 14 s. 8 d. what will 2 Yd. 2 q.
1 N. cost?

	ss.	s.	d.	
Q.	67	—	8	This line is set down twice instead of multiplying by 2 Yd.
2 1/2)	67	—	8	
N. 1 1/8)	33	1	4	
	4	—	3	
			2	}

3) 172 : 1 : 1

6) 57 : — : 8

4 : 1 : 1 } $\frac{4}{18}$

Answer .9 : 1 : 2 : — : 1

This operation is about 30 figures shorter than the common method.

Example 5.

If 12 C. of Sugar cost 12 l. 5 s. 6 d. what will
25 C. 1 Q. 16 lb. cost?

C. ss. s. d. C. Q lb.
If 12 cost 122 : 1 : 6, what 25 : 1 : 16?

	5	} 25 C.
613	: 1 : 6	
	5	

3068 : 1 : 6

a 4th of the price 30 : 1 : 4 : 2 for 1 Q.

a 7th of the price 17 : 1 : — : 3 for 16 lb.

C. 12) 3116 : 1 : 11 : 1

25.9 : 1 : 4

1 : 3 } Answer.

This operation is near 80 figures shorter than the common method. Example

Example 6.

What must I receive for a Debt of 1 l. 5 s. 10 d.
if 18 s. in the Pound is allowed?

$$\begin{array}{r}
 \text{ss.} \quad \text{ss.} \quad \text{ss.} \quad \text{s.} \quad \text{d.} \\
 \text{for 10 I receive 9, what 12 : 1 : 10 ?} \\
 \hline
 9 \\
 1|0) 11|0 : - : 6 \\
 \hline
 \text{Answer } 1.1 : 1 : 3
 \end{array}$$

Example 7.

What must I receive for a Debt of 21 l. 17 s. 9 d.
where 15 s. 1 d. in the Pound is allowed?

$$\begin{array}{r}
 \text{ss.} \quad \text{ss.} \quad \text{s.} \quad \text{d.} \quad \text{1|2} \quad \text{ss.} \quad \text{s.} \quad \text{d.} \quad \text{f.} \\
 10 \text{ --- } 7 : 1 : 1 \text{ --- } 218 : 1 : 9 : 2 \\
 \hline
 7 \text{ ss.} \\
 \hline
 \text{d.} \quad 1532 : - : 6 : 2 \\
 1|12) 109 : - : 10 : 3 \\
 \quad \quad 9 : - : 2 : 3 \\
 \hline
 1|0) 165|0 : 1 : 8 : - \\
 \hline
 \text{Answer } 16.5 : - : 2.
 \end{array}$$



GOLDEN RULE DOUBLE.

THIS Rule is work'd by some with Two states and, therefore is called the Double Golden Rule and it is also called the Rule of Five, because there are five numbers given, which must be placed thus: Place the first number, which is of the same kind with the *Answer* or thing sought, in the second Place; the Two numbers which depend upon (or are connected with, or relate to, or produce) this second number in the first place, under each other; and the other Two numbers in the third place under each other.

Note. Either of the Two numbers may be placed in the uppermost, but both the uppermost numbers must be of a kind.

The Numbers being thus placed, work according to the following

R U L E.

The numbers which are of a kind being reduced into one and the same Denomination, and the second number into the least Denomination mentioned, then, as there are two lines of Figures, place the Three numbers in the first line, and of them for the question as in the Rule of Three in your mind, assume either Extreme in the lower line for a Superfluous, and mark which of the Extremes in the upper line would be the *Multiplier*: Again form a Question according to the *Rule of Three* of the Two numbers in the second line, and the middle number in the upper line, assume either Extreme in the upper line for the Superfluous one, and mark which of the Extremes in the lower line would be the other *Multiplier*; then multiply the second number by one of these *Multipliers*, and

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duct multiply by the other, and divide this last
duct by the Product of the other Two numbers,
you will have the *Answer* in the same Denomi-
n with the second number, which reduce higher
cation be.

Example 1.

8 Mowers can mow 16 Acres in 24 Days, in
many Days can 16 Mowers mow 164 Acres?

Mowers.	Days.	Mowers.
* 8	24	16
Acres.		Acres.
16		164 *

Now I form a Question in the mind according to
Rule, thus: If 8 Mowers are 24 Days in mowing
16 Acres, how many Days will 16 Mowers mow the
Quantity of Acres? Now there being twice as
Men to mow the 16 Acres, they certainly
mow them in half the time; therefore 8 the
Extreme is one *Multiplier*; then I say, if 16
are mown in 24 Days by 8 Mowers, in how
Days will the same Mowers mow 164 Acres,
or in more Days; therefore 164 the greater Ex-
treme in the second line is the other *Multiplier*; and
I work as follows.

Second number 24 Days

8 Mowers, one Multiplier.

$$\begin{array}{r}
 192 \\
 + 164 \text{ Acres the other Multiplier} \\
 \hline
 768 \\
 1152 \\
 \hline
 256) \quad 31488 \text{ (123 Days, Answer)} \\
 \underline{2560} \\
 588 \\
 \underline{512} \\
 768 \\
 \underline{768} \\
 000
 \end{array}$$

Example

Example 2.

If when the Bushel of Wheat is sold for 8 s. 6 d. the Penny Loaf weighs 7 oz. what ought a Loaf worth 9 d. to weigh, when the Bushel is sold for 5 s. 8 d.

s. d.	oz.	s. d.
8 : 6	7	5 : 8
6		6
* 51 dd.		34 dd.
d.		d.
1		9 *

Here I say, if when the Bushel is sold for 8 s. 6 d. the 1 d. Loaf weighs 7 oz. how many Ounces will the said 1 d. Loaf weigh, when the Bushel is sold for 5 s. 8 d.? The Bushel being cheaper, the 1 d. Loaf must certainly weigh more than 7 oz. therefore 6 d. is one *Multiplier*; then I say, if a Loaf worth 1 d. weighs 7 oz. when the Bushel is sold for 8 s. 6 d. what ought a Loaf worth 9 d. to weigh, when the Bushel is sold for the same money? *Answer* must therefore 9 d. is the other *Multiplier*.

The Work follows.

7 oz.	
9 d.	
63	
51 dd.	
315	
34)	3213 oz. (94 oz.
153	
17	94 oz. 10 pw. <i>Ans</i>
20	
34) 340 pw. (10 pw.	
0	

Example

Golden Rule Double.

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Example 3.

If 6 Clerks can write 45 Sheets of Paper in 5 Days,
How many Clerks can write 300 Sheets in 13 Days after
the same proportion?

S.	C.	S.
45	6	300 *
Days		Days.
* 5		13
	6 Clerks	
	5 Days	

Sheets	45	30	
Days	13	300 Sheets.	
585)	9000	(15 Clerks.	
	3150		
	225		
		Answer 15 Clerks	$\frac{225}{585}$

Example 4.

If 400 Pecks of Corn will serve 15 Horses 14
Days, what Quantity will 500 Horses eat in 20 Days?

H.	P.	H.
15	400	500 *
D.		D.
14		20 *
	400 Pecks.	
	500 Horses.	
Horses 15	200000	
Days 14	20 Days.	
21 0	{ 3) 400000 0 Pecks.	
	{ 7) 133333---1 }	13
Answer Pecks 19047-4		

Example

Example 5.

If the Carriage of 42 C. 13 Miles cost 18 l. 10 s. 8 d.
what must I pay to have 16 C. carried 85 Miles.

C.	ss.	C.
42	185	16 *
M.		M.
13		85 *

$$\begin{array}{r} \text{ss.} \\ 185 \\ 16 \text{ C.} \end{array}$$

$$\begin{array}{r} 2960 \\ 85 \text{ Miles.} \end{array}$$

$$\begin{array}{r} \text{C. 42} \quad 1480 \\ \text{Miles 13} \quad 2368 \end{array}$$

$$546) 251600 \text{ ss. } (46.0 \text{ ss.}$$

$$\begin{array}{r} 3320 \end{array}$$

$$\begin{array}{r} 440 \text{ ss.} \\ 2 \end{array} \quad 46 \text{ l. } 1 \text{ s. } 7 \text{ d. } 1 \text{ f. } \frac{198}{546}$$

Answer

$$\begin{array}{r} 880 \text{ s.} \\ 12 \end{array}$$

$$546) 10560 \text{ d. } (19 \text{ d.}$$

$$\begin{array}{r} 5100 \end{array}$$

$$\begin{array}{r} 186 \\ 4 \end{array}$$

$$546) 744 \text{ f. } (1 \text{ f.}$$

$$\begin{array}{r} 198 \end{array}$$

182

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Of Decimal Fractions.

A Decimal Fraction is a Unit divided, or supposed to be divided, into 10 equal parts; and every one of those parts again into 10 other equal parts; so that in the second place, the Unit is divided into 100 parts, and in the third place into 1000 parts, &c. as will plainly appear in the following Table.

X's Thousands.
 Thousands.
 Hundreds.
 Tens.
 Units.
 Tenth
 Hundredth
 Thousandth
 X. Thousandth
 C. Thousandth

} part of
 } a Unit.

The figures on the left hand the prop are whole numbers ; those on the right hand are Decimal parts, one or more of which is called a *Decimal Fraction*.

If any other figure had been set down in any of the Decimal places, it would have been so many of those parts as the figure had expressed; as for Instance, in the second place a Unit is divided into a Hundred parts, consequently if there had been a 5 or 6 there, it would have been 5 or 6 Hundredth parts of a Unit, and the like in any of the other places. By

By the above Table it is evident, that as in whole numbers every figure increases it's value by a tenfold proportion from the Units place towards the left hand, so in Decimal parts every figure from the prop towards the right hand decreases in the same proportion; so that all whole numbers are in effect but Decimal parts one of another.

Observe, as Cyphers set on the left hand of whole Numbers neither increase nor diminish their Value, so Cyphers on the right hand of Decimals neither increase nor decrease their Value.



Addition of DECIMALS.

R U L E.

IN placing of the figures, observe to place the prop one under another, and add as in whole numbers, and in the Total (or Sum of all) set the prop under the other props.

E X A M P L E S.

What is the Sum of 87.4 and 9.8 and .128 and .098?

$$\begin{array}{r} 87.4 \\ 9.8 \\ .128 \\ .098 \\ \hline \end{array}$$

97.426 Answer 97 Yd. and .426

read thus; four, two, Six of a Decimal, which is near a half Yard, as will be shewn hereafter.

Add 5.7 and 316. and .169 and .0098 and 69, into one Sum.

$$\begin{array}{r} 5.7 \\ 316. \\ .169 \\ .0098 \\ 69. \\ \hline \end{array}$$

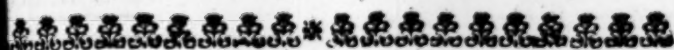
Sum 390.8788

What

What is the Total of .714 and .23 and .406 and .071?

$$\begin{array}{r} .23 \\ .406 \\ .9 \\ .071 \\ \hline \end{array}$$

Answer 2.321



Multiplication of DECIMALS.

R U L E.

SET down the *Multiplier* under the *Multiplicand* as in whole numbers, and multiply them together as in whole numbers; then make as many Decimal places in the *Product*, as there are in both the *Multiplicand* and *Multiplier*; if there be not so many, make up the number with *zeros*, placing them on the left hand of the *Product*.

Example 1.

Multiply 16.47 by 4.2

$$\begin{array}{r} 16.47 \\ \times 4.2 \\ \hline 11529 \\ 6594 \\ \hline \end{array}$$

Example 2.

Multiply .321 by 72

$$\begin{array}{r} .321 \\ \times 72 \\ \hline 2889 \\ 2247 \\ \hline \end{array}$$

Example

Y

Example 3.

$$\begin{array}{r}
 1.2141 \\
 \times 8.51 \\
 \hline
 97128 \\
 36423 \\
 \hline
 10.089171
 \end{array}$$

Example 4.

$$\begin{array}{r}
 .1816 \\
 \times .0067 \\
 \hline
 12712 \\
 10896 \\
 \hline
 .00121672
 \end{array}$$

Example

$$\begin{array}{r}
 4.276 \\
 \times 6.77 \\
 \hline
 2993417 \\
 2993417 \\
 \hline
 28.963447
 \end{array}$$

A Compendious way of multiplying numbers which have many Decimal places, so as to have as many number of Decimal places in the *Product*.

R U L E.

Place the *Multiplier* under the *Multiplicand* in the contrary way; but observe, that the Units Figure stands under that place of Decimals in the *Multiplicand* which you would have to be the last in the *Product* (that is, if you would have 4 Decimal places in the *Product*, set the Units figure of the *Multiplier* under the fourth place of Decimals in the *Multiplicand*, &c. if 3 Decimal places in the *Product* set the Units figure under the third place, &c.) then in multiplying, always begin at that figure of the *Multiplicand*, which stands over the figure you multiply by, taking in what would have been carried from the omitted figures on the right hand, had they been multiplied; and observe to place the first figure of every *Product* under each other, &c.

Note, If the *Product* of the omitted figures be nearer 10 than 1, carry 1, if nearer 20 than 10 carry 2, &c.

The last Example thus work'd, and let there be only 3 places of Decimals.

Example

Example 1.

27631

77.6 Multiplier reversed, or set down the contrary way.

658 } Product by { 6 } with { 2 } carried from the { 20 } than { 10 }
 993 } { 7 } { 4 } product of the { 40 } { 50 }
 299 } { 7 } { 5 } omitted figures { 50 } { 60 }
 13 } { 3 } { 1 } it being nearer { 10 } { 1 }

63 Product.

Example 2.

Multiply 12.3415 by .4372 and produce 4 places of decimals in the Product.

Operation at large.

Operation contracted.

12.3415
 .4372

 24 6830
 863 905
 3702 45
 49366 0

 5.3957 0380

12.3415
 2 734.0 reversed.

 49366
 3702
 864
 25

 5.3957

Note, When there is no Units figure in the Multiplier, in the last Example, or when there are not so many decimal places in the Multiplicand as are wanted in the Product, as in the next Example; supply the defect with a Cypher or Cyphers, either set down or supposed.

Example

Example 3.

Multiply 783.42 by 3.4674, so as there may be three places of Decimals in the *Product*.

Operation at large.

$$\begin{array}{r}
 783.42 \\
 3.4674 \\
 \hline
 313368 \\
 548394 \\
 470052 \\
 313368 \\
 235026 \\
 \hline
 2716.430508
 \end{array}$$

Operation contracted.

$$\begin{array}{r}
 783.420 \\
 4764.3 \text{ reversed} \\
 \hline
 2350260 \\
 313368 \\
 47005 \\
 5484 \\
 313 \\
 \hline
 2716.430
 \end{array}$$

Example 4.

Let .2342 be multiplied by .0534, so as four places of Decimals may be in the *Product*.

At large.

$$\begin{array}{r}
 .2342 \\
 .0534 \\
 \hline
 9368 \\
 7026 \\
 11710 \\
 \hline
 .01250628
 \end{array}$$

Contracted.

$$\begin{array}{r}
 .2342 \\
 4350.0 \text{ reversed} \\
 \hline
 117 \\
 7 \\
 1 \\
 \hline
 .0125
 \end{array}$$

In the contracted method there ought to be four Decimal places in the product; but there coming only three, therefore I fix a Cypher to the left hand to make up the number.

Note,
100, &c
rarer the
Multiplier.

thus, 41.

Sub

Sub

AVI
work
d place
ops.

E

rom 12.1
Take .6

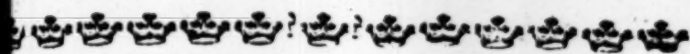
em. 11.4

E

Take 14.7

Note, To multiply any Decimal by 10, 100, 1000, &c. is only removing the prop so many places to the right hand, as there are Cyphers in the Multiplier.

Thus, 41.61 multiplied by $\left\{ \begin{array}{l} 10 \\ 100 \\ 1000 \\ 10000 \end{array} \right\}$ is $\left\{ \begin{array}{l} 416.1 \\ 4161. \\ 41610. \\ 416100. \&c \end{array} \right.$



Subtraction of DECIMALS.

R U L E.

HAVING placed the numbers as in Addition, work still as if they were all whole numbers, and place the prop in the remainder under the other ops.

Example 1.

From 12.1468 take .647
 Take .647

 Rem. 11.4998

Example 2.

From 100. take 1.4854
 Take 1.4854

 Rem. 98.5146

Example 3.

Take 14.781 from 69.8141
 14.781

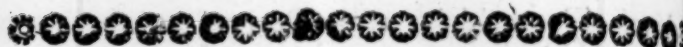
 Rem. 55.0331

Example 4.

Take .874 from 9.
 .874

 Rem. 8.126

Division



Division of DECIMALS.

THE operation is the same here, as in whole Numbers; the only difficulty is to value the Quotient, which may be done by the following

R U L E.

Subtract the Decimal places in the *Divisor* from those in the *Dividend*, and so many places as remain you must have in the Quotient; but if there be not so many places in the Quotient, supply their defect by fixing Cyphers to the left hand. See *Exam. 1, 2, 6,*

E X C E P T I O N.

But when there happens to be a Cypher or Cyphers at the right hand of the *Divisor*, cut them off as in whole numbers, and instead of cutting off so many figures in the *Dividend*, set the prop in the Quotient so many figures nearer the left hand, as there are Cyphers cut off, besides observing the above Rule. See *Example 3, 4, 5, 9.*

Note, 1st. Four places of Decimals are sufficient for the *Answer* to a *Question*; but if they are to be worked with afterwards, make more, and you will have the *Answer* more exact.

2^d. If there be not so many Decimal places in the *Dividend*, so that you may have a sufficient number in the Quotient, fix Cyphers to the right hand of the *Dividend*, which suppose to be Decimal places. See *Examples 10, and 11.*

3^d. When the Decimal places in the *Divisor* and *Dividend* are equal, the Quotient will be a whole Number. See *Example 7.*

3) 47

15.

Observe
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the Qu
in the t

Exam

3) 51.4

2.570

Had the
prop m
t in the
efore I
ed; but
above.
Therefor
oo, &c.
arer the l

nus, 41.6

Note, 7
se in pag

Example

Example 1.

Example 2.

$$\begin{array}{r} 3) 47.1614 \\ \hline 15.7204 \text{ \&c.} \end{array}$$

$$\begin{array}{r} 12) .16146 \\ \hline .01345 \text{ \&c.} \end{array}$$

Observe, when the Quotient stands under the *Dividend*, and the *Divisor* be a whole Number, the prop of the *Quotient* will stand under that in the *Dividend*, in the two Examples above.

Example 3.

Example 4.

Example 5.

$$\begin{array}{r} 5) 1.416 \\ \hline 2.5708 \end{array}$$

$$\begin{array}{r} 8|0) 162.345 \\ \hline 2.0293 \text{ \&c.} \end{array}$$

$$\begin{array}{r} 5|000) 7.161 \\ \hline .001432 \text{ \&c.} \end{array}$$

The last Example explained :

Had there been no Cyphers in the *Divisor*, then the prop must have been set in the Quotient under that in the *Dividend*; but as there are three Cyphers, therefore I set the prop three places nearer the left hand; but if there be not so many places, fix Cyphers above.

Therefore to divide any Number by 10, 100, 1000, &c. is only removing the prop so many places nearer the left hand, as there are Cyphers in the *Divisor*.

$$\text{Thus, } 41.61 \text{ divided by } \left\{ \begin{array}{c} 10 \\ 100 \\ 1000 \\ 10000 \end{array} \right\} \text{ is } \left\{ \begin{array}{c} 4.161 \\ .4161 \\ .04161 \\ .004161 \text{ \&c.} \end{array} \right.$$

Note, These operations are direct the reverse to those in page 189.

Example

Example 6.

Divide 716.8842 by 3.6

$$\begin{array}{r} 6 \overline{) 716.8842} \\ \underline{000000} \\ 1194807 \end{array}$$

$$\begin{array}{r} 6 \overline{) 1194807} \\ \underline{000000} \\ 199134 \text{ \&c.} \end{array}$$

199.134 &c.

Example 7.

Divide 23.2416 by .01

$$\begin{array}{r} 12 \overline{) 23.2416} \\ \underline{000000} \\ 19368 \end{array}$$

$$\begin{array}{r} 12 \overline{) 19368} \\ \underline{000000} \\ 1614 \end{array}$$

1614.

Example 8.

4.3) .0491645 (.011433 &c.

$$\begin{array}{r} .61 \\ \underline{000000} \\ 186 \\ \underline{000000} \\ 144 \\ \underline{000000} \\ 155 \\ \underline{000000} \\ 26 \end{array}$$

Example 10.

Divide 21.4 by .47

.47) 21.400000 (45.5319

$$\begin{array}{r} 47 \overline{) 21.400000} \\ \underline{000000} \\ 260 \\ \underline{000000} \\ 250 \\ \underline{000000} \\ 150 \\ \underline{000000} \\ 90 \\ \underline{000000} \\ 430 \\ \underline{000000} \\ 7 \end{array}$$

.7

Example 9.

141)0) .478609 (.000338

$$\begin{array}{r} .556 \\ \underline{000000} \\ 1330 \\ \underline{000000} \\ .619 \\ \underline{000000} \\ .55 \end{array}$$

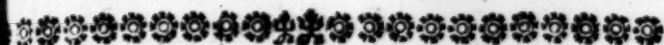
Example 11.

Divide 3.41 by .053

.053) 3.4100000 (64.339

$$\begin{array}{r} 53 \overline{) 3.4100000} \\ \underline{000000} \\ 230 \\ \underline{000000} \\ 180 \\ \underline{000000} \\ 210 \\ \underline{000000} \\ 510 \\ \underline{000000} \\ 330 \\ \underline{000000} \\ 12 \end{array}$$

12



Reduction of Decimals.

REDUCTION Teacheth to reduce any Remainder after *Division*, or the part of a Unit or the thing, into Decimal parts; and the contrary, and what part of a whole Number any Decimal is.

CASE I.

To find the Decimal to any remainder in common Division.

RULE.

Place the prop after the remainder, and imagine or add so many Cyphers as to have a sufficient number of Decimal places in the Quotient; then divide by the same *Divisor* which produced that remainder.

Example 1.

Reduce 9 to a Decimal which remain'd in dividing by 20, in *Example 4*, page 28.

Numerator 9 } These, or any other numbers
Denominator 20 } placed after this manner with a
line drawn between them, are
a *Vulgar Fraction*; so that all *Vulgar Fractions*
may be brought into Decimals, by fixing Cyphers to
the Numerator after the prop, and dividing by the
Denominator, thus:

$$2 \overline{) 9.0}$$

$$\underline{} \\ .45 \text{ Answer.}$$

Z

Example

Example 2.

Reduce $\frac{5}{8}$ to a Decimal.

$$\begin{array}{r} 8 \overline{) 3} \\ \hline \end{array}$$

.375 Answer.

Example 3.

Reduce $\frac{814}{1200}$ to a Decimal.

$$\begin{array}{r} 12 \overline{) 00} 814 \\ \hline \end{array}$$

.6783 Answer.

A Vulgar Fraction is to be read thus,

$\left. \begin{array}{l} \frac{1}{3} \\ \frac{2}{5} \\ \frac{8}{13} \end{array} \right\}$ signifies $\left\{ \begin{array}{l} \text{one third,} \\ \text{two fifths, or 2 fifth parts,} \\ \text{8 thirteenths, or 8 thirteenth parts.} \end{array} \right.$

CASE 2.

To find the Decimal to any part of a Unit whole thing.

RULE.

Set the prop after the part, and suppose Cyph then divide by the same Number, as if you were Reduce any quantity of those parts into the Unit whole thing.

Exam

Example 1.

What is the Decimal of $\frac{2}{4}$ of any thing?

$$\begin{array}{r} 2. \\ 4 \overline{) 1.} \\ \hline \end{array}$$

.25 Answer.

Example 2.

What is the Decimal of $\frac{2}{4}$ of a Yard?

$$\begin{array}{r} 2. \\ 4 \overline{) 2.} \\ \hline \end{array}$$

.5 Answer.

Example 3.

What is the Decimal of $\frac{2}{3}$ of any thing?

$$\begin{array}{r} 2. \\ 4 \overline{) 3.} \\ \hline \end{array}$$

.75 Answer

Example

Example 4.

What is the Decimal of 5 s. supposing the U
to be 1 l.?

$$\begin{array}{r} 5. \\ 20 \overline{) 5.} \\ \hline \end{array}$$

.25 Answer

Or thus,

$$\begin{array}{r} 2. \\ 4 \overline{) 1.} \text{ of a } l. \\ \hline \end{array}$$

.25 Answer.

EXAMPLE 5.

Reduce ^{oz.} 7 to a Decimal, a lb. Troy being the U

$$\begin{array}{r} \text{oz.} \\ 12 \overline{) 7.} \\ \hline \end{array}$$

Answer .5833

EXAMPLE 6.

Reduce ^{d.} 5 to a Decimal, a Shilling being the U

$$\begin{array}{r} d. \\ 12 \overline{) 5.} \\ \hline \end{array}$$

Answer .4166

EXAMPLE

E X A M P L E 7.

Reduce 5 *d.* to a Decimal, a *l.* being the Unit.

$$\begin{array}{r} \text{ence in a l. } 24 \mid 0 \left\{ \begin{array}{l} \overset{d.}{12) 5.} \\ 2) .4166 \\ \hline .02083 \end{array} \right. \end{array}$$

E X A M P L E 8.

What is the Decimal of 3 Farthings a *l.* being the Unit?

$$\begin{array}{r} \text{farthings in a l. } 96 \mid 0 \left\{ \begin{array}{l} \overset{f.}{8) 3.} \\ 12) .375 \\ \hline \end{array} \right. \\ \text{Answer } .003125 \end{array}$$

But if the part of the Unit, or whole thing be of several Denominations, then in order to reduce them into a Decimal of the highest value, you must observe the following

R U L E.

Reduce the lowest part into a Decimal of the next higher Denomination as before, and place the number of this Denomination (if there be any) on the left side the prop; then reduce this into a Decimal of the next higher Denomination, and place the number of this denomination on the left side the prop; and thus go on till you have the Decimal of the thing proposed.

E X A M P L E

*Reduction of Decimals.**EXAMPLE 1.*

s. *d.*
Reduce 18 : 7 to a Decimal, a *l.* being the Unit.

$$\begin{array}{r} 12 \overline{) 7} \\ 2 \overline{) 0} \text{ s. } 18.5833 \end{array}$$

Answer .92916

EXAMPLE 2.

s. *d.*
Reduce 12 : 3 to a Decimal, a *l.* being the Unit.

$$\begin{array}{r} 12 \overline{) 3} \\ 2 \overline{) 0} \text{ s. } 12.25 \end{array}$$

Answer .6125

Observe, when there is any Denomination given, and 1 *Q.* 2 *Q.* 3 *Q.* of that Denomination to bring into a Decimal, since in Case first it is easily seen what is the Decimal of 1 *Q.* 2 *Q.* or 3 *Q.* of any thing; therefore in the last Question 3 *d.* being 1 *Q.* of a Shilling, I only set down the 12 *s.* and the Decimal for the 1 *Q.* and bring it into the Decimal of a *l.* thus:

$$\begin{array}{r} \text{ s. } \\ 2 \overline{) 0} \text{ 12.25} \end{array}$$

Answer .6125 as above, and so of any other.

EXAMPLE

Example 3.

Reduce 9 s. 4 d. 2 f. to the Decimal of a l.

d.
12) 4.5 In this Question I put down 4 d. and
also .5 for 2 f. and then divide.

$$2|0) 9.375$$

.46875 Answer.

Example 4.

s. d.
Reduce 3 : 6 to the Decimal of 1 l.

$$s.
10) 3.5$$

Example 5.

s. d.
.175 *Answ.* Reduce 1 : 9 to the Decimal of 1 l.

$$s.
2|0) 1.75$$

Example 6.

d. f.
Reduce 1 : 3 to the Decimal of 1 l.

s.
Answer .0875

$$d.
12) 1.75$$

Example 7.

Q. N.
2|0) .1458 Red. 1 : 2 to the Decimal of a Yd.

$$.00729 \text{ } \underline{\text{Answ.}} \quad \begin{array}{r} \text{Q} \\ 4) 1.5 \end{array}$$

Answer .375

EXAMPLE 8.

Q. N.
What Decimal of a Yard is 3 : 3 ?

$$\text{Q} \\ 4) 3.75$$

Answer .9375

EXAMPLE

Reduction of Decimals.

EXAMPLE 9.

What Decimal of a *lb.* is 7 *oz.* 3 *pw.*?

$$\begin{array}{r}
 \text{pw.} \\
 2 \overline{) 3.} \\
 \hline
 12 \overline{) \text{oz. } 7.15} \\
 \hline
 \text{Answer } .59583 \\
 \hline
 \hline
 \end{array}$$

EXAMPLE 10.

Reduce 9 *oz.* 15 *pw.* to the Decimal of a *lb.* Troy.

$$\begin{array}{r}
 \text{oz.} \\
 12 \overline{) 9.75} \\
 \hline
 \text{Answer } .8125 \\
 \hline
 \hline
 \end{array}$$

EXAMPLE 11.

Reduce 3 *℥.* 21 *lb.* to the Decimal of a *C.*

$$\begin{array}{r}
 \text{℥.} \\
 4 \overline{) 3.75} \\
 \hline
 \text{Answer } .9375 \\
 \hline
 \hline
 \end{array}$$

EXAMPLE

Example 12.

Example 13.

What is the Decimal of 1 $\mathcal{Q}$.] What Decimal parts of
lb. a C. being the Unit ?] a C. are equal to 5 lb. ?

$$\begin{array}{r} \text{lb.} \\ \{ 4) 17. \\ \hline 7) 4.25 \\ \hline \end{array}$$

$$4) \mathcal{Q}. 1.60714$$

Answer .40178

$$\begin{array}{r} \text{lb.} \\ 28 \left\{ \begin{array}{l} 4) 5. \\ \hline 7) 1.25 \\ \hline \end{array} \right. \end{array}$$

$$4) \mathcal{Q}. .17857$$

.04464

CASE 3.

To Value a DECIMAL FRACTION.

RULE.

Work as if you were to reduce some number of
name which your Decimal is of, into a lower
nomination, then set the prop in the *Product* in its
per place; the figures on the left hand are so many
that lower Denomination, and those on the right
the Decimal of that Denomination; and if you
uld value this last Decimal, observe the Rule a-
e, and so on in any Decimal.

A 2

Value

Value the following Decimals of a Pound Sterling

Example 1.

.92916
20 s.

s. 18.58320
12 d.

d. 6.9984
4 f.

f. 3.9936

Answer 18 s. 7 d. wanting less than 7000th parts of a Pound

Example 2.

.6125
20 s.

s. 12.2500

Answer 12 s. 3 d. without further multiplying, for is 1 $\frac{1}{2}$ of any thing.

Example 3.

.46875
20 s.

s. 9.37500
12 d.

d. 4.500

Answer 9 s. 4 d. 2 f. for $\frac{1}{2}$ is a half Penny.

Example 4.

.175
20

s. 3.500

Answer 3 s. 6 d. for a half s. or 6 d.

Note, The Cypher or Cyphers which are at right hand of Decimals I omit multiplying, as *Examples* 1 and 3 above.

Exam

Example 5.

$$\begin{array}{r} .0875 \\ 20 \\ \hline s. 1.7500 \\ \hline \end{array}$$

Answer 1 s. 9 d. for .75 is
2. of a s. or 9 d.

Example 6.

$$\begin{array}{r} .00729 \\ 20 \\ \hline .14580 \\ 12 \\ \hline d. 1.7496 \\ 4 \\ \hline f. 2.9984 \\ \hline \end{array}$$

Answer 1 d. 3 f. wanting
less than 2000 parts of a f.

What's the Value of the following Decimals of a Yard?

Example 7.

$$\begin{array}{r} .375 \\ 16 N. \\ \hline f. N. 6.000 \\ \hline \end{array}$$

Example 8.

$$\begin{array}{r} .9375 \\ 16 N. \\ \hline Answer N. 15.0000 \\ \hline \end{array}$$

What's

Reduction of Decimals:

What's the Value of the following Decimals of a Troy?

Example 9.

Example 10.

.59583
12 oz.

.8125
12 oz.

oz. 7.14996
20 pw.

oz. 9.7500

pw. 2.99920

Answer 9 oz. 15 pw. 15
.75 is 3 $\frac{1}{2}$ of an oz.
15 pw.

6 }
59952 } 24 gr.
4 }

gr. 23.9808

Answer 7 oz. 3 pw. very near.

Value the following Decimals of a C.

Example 11.

Example 12.

.9375
4 $\frac{1}{2}$

.40178
4 $\frac{1}{2}$

$\frac{1}{2}$. 3.7500

$\frac{1}{2}$. 1.60712

Answer 3 $\frac{1}{2}$. 21 lb.

7 }
424984 } 28
4 }

lb. 16.99936

Ans. 1 $\frac{1}{2}$. 17 lb. wanting less than 70000 parts of

Multi

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Observe
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ore, &c.
illings, for
Twa-bill

Or thus,

Multiply .40178 by 112 as in page 46.

$$\begin{array}{r}
 .40178 \\
 .40178 \\
 40178 \\
 40178 \\
 \hline
 \text{lb. } 44.99936
 \end{array}$$

As before.

These 12 *Examples* are Proofs to the first 12 in pages 198, 199, 200, and 201.

Observe, if I had gone to more places of Decimals in this Case, some of the *Answers* would have been nearer the Proof.

To Value the DECIMAL of 1 Pound Sterling at sight.

R U L E.

Take three places next after the prop, and call every 100 *Two-shillings*, then 50 will be one *Shilling*, &c. and what is above or under 50 call *Farthings*, abating 2 of a *Farthing* for every 6; and if there be 5, 5, or 75 next after the three places, you may add 2, 2 2, or 3 2 of a *Farthing*. This Rule being observed will give the *Answer* so exact as not to want 2 of a *Farthing*.

The reason of the above RULE is this:

If 1000 *Farthings* were contain'd in a Pound, then the three places next after the prop would be exact *Farthings*; but as there are only 960, which are 40 short of 1000; therefore in calling the three figures after the prop *Farthings*, since in 1000 I reckon 40 more than the truth, consequently in 100 I reckon 4 more, &c. and therefore I call 100 of them *Two-shillings*, for 4 taken from 100 leaves 96, the *Farthings*.

Example

206 *Questions in Multiplication of Decimals.*

Example 1. Example 2: Example 3.

.92916

.6125

.46875

Answer 18 s. 7 d. *Answ.* 12s. 3d. *Answ.* 9s. 4d. 2f

The last Example explain'd :

I take the three places next after the prop, which are 468, the 4 Hundreds I call 4 ss. and 50 I call 1 more ; then the 18 which is above 50 I call *Farthing* abating 1 *Q.* for every 6, that is 3 *Q.* abated ; and for the 75 which is next the three places, I abate 3 *Q.* so the *Answer* is 9 s. 4 d. 2 f. as abovoe.

Example 4. Example 5. Example 6.

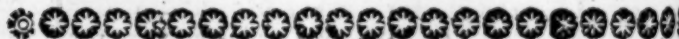
.175

.0875

.00729

Ans. 3 s. 6 d. *Answ.* 1 s. 9 d. *Answ.* 1 d. 3 f.

Compare these 6 *Examples* with the first 6 in pages 197 and 203.



Questions in Multiplication of DECIMALS

BY this Rule if the price of one be given, you may find what any Quantity of the same will come to.

R U L E.

Reduce the price into the Decimal of a Pound as was Taught in page 197, and if there be any part in the Quantity, reduce them also into a Decimal then multiply the price by the Quantity for the *Answer*.

Example

If 1
cost 2

See Exam

What will
per C.

Multiplier

See Exam

Observe,
you multiply

EXAMPLE 1.

If 1 Yard cost 2 l. 13 s. 5 d. what will 19 Yards cost ?

l.
2.67083
19 Yd.

Answer 50.74577 or 50 l. 14 s. 11 d.

See Example 19, page 82.

EXAMPLE 2.

What will 42 : 1 : 19 of Sugar come to, at 2 : 9 : 4 per C. ?

C.
Multiplier 1.2.46666 reversed 66 664.2

42.41964
848393
169679
25452
2545
254
25

Answer 104.6348

Or 104 : 12 : 8 : 1
l. s. d. f.

See Example 72, page 137.

Observe, when the Quantity is 100 or 1000, then multiply by removing the prop, as in page 189.
Example

Example 3.

rd. d. f.
100 at 2 : 1 per Yard.
Answer .00.9375 or 18 : 9

EXAMPLE 4.

l. s. d.
100 Pieces at 1 : 17 : 6 per Ps.
Answer 1.87.5 or 187 : 10

EXAMPLE 5.

d. f.
1000 Yards at 1 : 3
Answer .007.2916 or 7 : 5 : 10

See Example 8, page 88

EXAMPLE 6.

1000 at 3 s.
Answer .150. or 150 l.

Question



Questions in Division of DECIMALS.

Example 1.

l. s. d.

3 Pieces cost 180 : 1 : 4, what will 1 *Ps.* cost?

l. s. d.
73) 180.0666 (2.4666 Answer 2 : 9 : 4

340

486

486

486

See Example 17, page 103.

Observe, when you set down the last Figure in any
dividend, there is no occasion to multiply and subtract
and the remainder, it being of so little Value.

Example 2.

l. s. d.

7 Yards cost 3 : 15 : 6, what will 1 *Yd.* cost?

l. s. d. f.
57) 3.7750 (.0662 or 1 : 3 : 3 fully.

555

130

Example

B b

Example 3.

If I give 1 *l.* 13 *s.* for 1 *C.* of Sugar, what is
per *lb.* ?

$$\begin{array}{r}
 \text{112) } 1.6500 \text{ (}.0147 \text{ or } 3 : 2 \text{ Answer} \\
 \hline
 .530 \\
 \hline
 .820
 \end{array}$$

Example 4.

If a Person get 20 *l.* per Year, what is that per *D.*

$$\begin{array}{r}
 \text{365) } 20.0000 \text{ (}.0547 \text{ or } 1 : 1 \text{ Answer} \\
 \hline
 1750 \\
 \hline
 2900
 \end{array}$$

Example 5.

How much per Gallon is 2 : 5 : 6 per Hoghead

$$\begin{array}{r}
 \text{63} \left\{ \begin{array}{l} 9) \quad 2.275 \\ \hline 7) \quad .25277 \\ \hline \end{array} \right.
 \end{array}$$

Answer .03611 or 8 *d.* 2 *f.*
Prac

Practice in DECIMALS.

IN some Examples we can work shorter, and easier here, than in Vulgar Arithmetick.

C A S E I.

When the Price is an even part of a Pound, or of an even part.

R U L E.

When the Quantity is prepared as in Vulgar Arithmetick, instead of supposing it to be *Two-shillings's*, suppose it to be Pounds; and if there be any part or parts in the Quantity, reduce it into a Decimal of that part of which the Price is given, and fix it to the proposed Pounds; and take such a part of the Line, as the Price is of one Pound; and for the part, if there be any, take part of that part.

Observe

A Table of the even parts of a Pound.

Observe, for the even parts of a Pound, your *Divisor* will be the same as for the even parts of *Two shillings* only fixing a Cypher to the right hand of the *Divisor*; as for instance 2 d. is a 12th part of *Two shillings*; therefore fixing a Cypher to the 12, shews that 2 d. is 120th part of a Pound, and so of the rest, as in the Table at the right hand,

s.	d.	th.
	2	120
	3	80
	4	60
	6	40
	8	30
1 : —		20
1 : 8		12

The rest of these parts are mentioned in page 52.

d.	f.	s.	d.	th.
2	: 2	1	: 8	8
3	: 3	2	: 6	8
5	: —	1	: 8	4
7	: 2	2	: 6	4
10	: —	1	: 8	2
15	: —	2	: 6	2
16	: —	4	: —	3

For first work for and take one part of for the

Example I.

s.	d.	d.	f.
2	: 6	8)	341 at 3 : 3
d.	f.		
3	: 3	8)	42.625

Answer 5.328125

Or 5 l. 6 s. 6 d. 3 f.

Or,

Note,

line at 20

Observe

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E X A M P L E 2.

$$\begin{array}{rcl}
 \text{s. d. f.} & \text{Ells. d. f.} & \\
 2:6 & 8) 671 \text{ at } 7:2 & \\
 7:2 & 4) 83.875 &
 \end{array}$$

Answer 20.96875

Or 20 l. 19 s. 4 d. 2 f.

d. Example 3.

$$\begin{array}{rcl}
 20 & 12 & \left. \begin{array}{l} d. \\ 164 \text{ at } 23 \end{array} \right\} \\
 3 & 80 & \\
 & & 13.6666 \text{ at } 20 d. \\
 & & 2.05 \text{ at } 3 d.
 \end{array}$$

Answer 15.7166

Or, 15 l. 14 s. 4 d. See Example 1, page 143.

Note, If the line at 3 d. be *Subtracted* from the line at 20 d. you'll have the *Answer* at 17 d.

Observe, in page 191 was Taught when there was a Cypher at the right hand of the *Divisor*, to set the prop a figure nearer the left hand; but here as the Quotients are to be added up, therefore the props must stand under one another, in order to which begin as if you would divide by the whole *Divisor*, and when you perceive where the first figure should stand, then divide without the Cypher.

As for instance, in dividing by 80 in the *Example* above, with asking how often 80 in 164, I find the first figure will stand under the Units place, *viz.* under the 4; then I go on without the Cypher.

Example

EXAMPLE 4.

$$\begin{array}{r}
 \begin{array}{l} d. \ f. \\ 20 \end{array} \left| \begin{array}{l} 12) \ 362 \text{ at } 22 : 2 \\ \hline 2 : 2 \end{array} \right. \begin{array}{l} d. \ f. \\ 8) \ 30.16666 \text{ at } 20 \ d. \\ \hline 3.77083 \text{ at } 2 \ d. \ 2 \ f. \end{array}
 \end{array}$$

Answer 33.93749

Or 33 l. 18 s. 9 d. See Example 2 page, 143

Here if the line at 2 d. 2 f. be *Subtracted* from the line at 20 d. you'll have the *Answer* at 17 d. 2 f.

See E

EXAMPLE 5.

$$\begin{array}{r}
 \begin{array}{l} 12. \ 2. \ d. \ f. \\ 471 : 1 \text{ at } 20 : 1 \end{array} \\
 \begin{array}{l} d. \\ 20 \end{array} \left| \begin{array}{l} 12) \ 471.25 \\ \hline f.1 \end{array} \right. \begin{array}{l} 80) \ 39.2708 \text{ at } 20 \ d. \\ \hline .4908 \text{ at } \text{---} \ 1 \ f. \end{array}
 \end{array}$$

Answer 39.7616

Or 39 l. 15 s. 2 d. 3 f.

Here, if the line at 1 f. be *Subtracted* from the line at 20 d. it gives the *Answer* at 19 d. 3 f.

Here in
the *Answer*

Example

EXAMPLE 6.

$$\begin{array}{rcl}
 \begin{array}{l} s. \ d. \\ 2 : 6 \end{array} & \left| \begin{array}{l} lb. \\ 8) 639 \end{array} \right. & \begin{array}{l} s. \ d. \\ at \ 2 : 1 \end{array} \\
 & & \hline
 \begin{array}{l} 5 \\ Subtract \end{array} & \left| \begin{array}{l} 6) 79.875 \\ 13.3125 \end{array} \right. & \begin{array}{l} s. \ d. \\ at \ 2 : 6 \\ at \ 5 \end{array} \\
 & & \hline
 Answer & & 66.5625
 \end{array}$$

Or 66 l. 11 s. 3 d.

See Example 45, page 124.

Here instead of Subtracting, if you add, you'll have
 Answer at 2 s. 11 d.

EXAMPLE 7.

$$\begin{array}{rcl}
 \begin{array}{l} s. \ d. \\ 3 : 4 \end{array} & \left| \begin{array}{l} Ells. \\ 6) 417 \end{array} \right. & \begin{array}{l} s. \ d. \ f. \\ at \ 3 : 4 : 2 \end{array} \\
 & & \hline
 \begin{array}{l} f. 2 \\ 80) \end{array} & \begin{array}{l} 69.5 \\ .86875 \end{array} & \\
 & & \hline
 Answer & & 70.36875
 \end{array}$$

Or 70 l. 7 s. 4 d. 2 f.

Example

Example 8.

$$\begin{array}{r}
 \text{Yd. } 2. \\
 \text{s. } 18 : 3 \text{ at } 4 \text{ s. } 7 \text{ d.} \\
 5 \overline{) 4) 18.75} \\
 \text{d. } 5 \overline{) 12) 4.6875} \text{ — at } 5 \text{ s.} \\
 \text{Subtract } .390625 \text{ at } - : 5 \text{ d.} \\
 \hline
 \text{Answ. } 4.296875 \text{ at } 4 : 7
 \end{array}$$

Or 4 l. 5 s. 11 d. 1 f.

See Example 48, page 125.

Here instead of Subtracting, if you add, you'll have the Answer at 5 s. 5 d.

Example 9.

$$\begin{array}{r}
 \text{lb. oz. pw. s. d.} \\
 5 : 7 : 14 \text{ at } 5 : 1 \text{ per oz.} \\
 12 \\
 \hline
 67 \text{ oz.} \\
 \text{oz.} \\
 \text{s. } 5 \overline{) 4) 67.7} \\
 \text{d. } 1 \overline{) 60) 16.925} \\
 \hline
 .28208 \\
 \hline
 \text{Answer } 17.20708
 \end{array}$$

Or 17 l. 4 s. 1 d. 2 f. See Exam. 71, p. 13

Here instead of adding, if you Subtract, you'll have the Answer at 4 s. 11 d.

Exam

Example 10.

Yd. Q. s. d.

43 : 3 at 5 : 4

43.75

8 Eight-pences in 5 s. 4 d.

3|0) 35 0.00 Eight-pences.

Answer 11.6 666

Or 11 l. 13 s. 4 d.

Example 11.

lb. s. d.

3) 407 at 6 : 7

80) 135.6666

Subtract 1.6958

Answer 133.9708

If in such Prices as are mentioned in this Case, there be also one or more Pounds, first multiply by the Pound or Pounds, then take for the parts.

33 l. 19 s. 5 d. See Example 16, page 114.

Example 12.

Example 13.

Yd. Q. l. s. d. s. d. l. s. d.

345 : 1 at 1 : — : 8 | 2 : 6 | 8) 426 at 2 : 2 : 6

426

53.25

345.25 Prod. by 1 l.

11.5083

356.7583

Answer l. 905.25

356 l. 15 s. 2 d.

C

CASE

CASE 2.

When the Price is any other Money, than what is mentioned in the last Case.

R U L E.

Multiply the Quantity or supposed Pounds by the Number of *Shillings* in the price, when brought into the Decimal of a Pound (or into *Two-shillings's* which will be the same,) then for the other Money take the several parts of a Pound; and if occasion be, part of that part.

Example 1.

lb. 2. s.
9 : 1 at 4

d.
9.25
.2

Answer 1.850

See Example 10 page, 149.

Example 2.

yd. N. s. d.
61 : 7 at 8 : 8

d.
8 | 30) 61.437 5
.4

24.57500

2.04791

Answer 26.62291

or 26l. 12s 5d. 2f.

Example 3.

lb. 2. s.
20 : 3 at 6

lb.
20.75
.3

Answer 1. 6.225 See Example 11, page 149.

Exam

Example 4.

7 oz. of Silk at 18 s. per lb.

.4375 Decimal for 7 oz.

.9

.39375

Answer 7 s. 10 d. 2 f. See Example 80, page 139.

Example 5.

Yd. Q. N. l. s.

39 : 1 : 2 at 1 : 16

39.375
1.8

Answer 70.8750 See Example 61, page 131.

Or 70 l. 17 s. 6 d.

Example 6.

C. Q. lb. l. s. d.

16 : 1 : 14 at 1 : 17 : 2

C.

2|20) 16.375

~~1.8~~

13.1000

2|6) .81875

.13645

Answer 30.43020 or 30 l. 8 s. 7 d. 1 f.

Example

Example 7.

	C.	2.	lb.	l.	s.	d.
	42	:	1	:	19	at 2 : 9 : 4
d.	C.					
8 30	42.41964					
	<u> </u>	5				
	21209820		5			
	<u> </u>					
	106.04910					
	1.413988					Sub.
	<u> </u>					

Answer l. 104.6.35112 See Example 72, page 137.

Example 8.

	C.	2.	l.	s.
14 Chests, each	6	:	3	,
	at	2	:	16
	per C.			
	C.			
	6.75			
	14 Chests.			
	<u> </u>			
	C. 94.50			
	<u> </u>	7		
	661.5		7	
	<u> </u>			
	4			

Answer l. 264.60 See Example 62, page 131.

Example

Or 10 s.
observe, in
Farthings
sing Cyp
dividing by
ve the lik

Example 9.

C. 2. lb. l. s. d.

19 : 1 : 7 at 6 : 13 : 3

C.

d. 2) 20) 19.3125
6.6

11.5875 0

115.8750

3) 4) .9656

.2414

128.6695 Answer. See Ex. 66, page 133:

Or, 128 l. 13 s. 4 d. 2 f.

Example 10.

18 lb. at 3 l. 6 s. 11 d. per C.

30 } .1607 Decimal for 18 lb.
30 }

3.3

.0482 1

.4821

.0053 5

.002

Or thus,

lb. ss. s. d.

16 | 7) 33 : — : 11

2 | 8) 4 : 1 : 6 : 2.857

1 : 2 : 1.358

per .5376 6

Answer .5 : — : 9 : — .215

Or 10 s. 9 d

Observe, in this last operation, what remain'd in Farthings place, I brought into a Decimal by adding Cyphers at the right hand of the Remainder, dividing by the Divisor, as is taught in page 193. See the like in any other Example.

Example

Example 11.

What must I receive for a Debt of 1 l. 5 s. 10 d. where 18 s. in the Pound is allowed?

$$\begin{array}{r} \text{l.} \\ 1.29166 \\ \underline{9} \end{array}$$

Answer 1.1 6249 4

Or 1 l. 3 s. 3 d. See Example 6, page 177

Example 12.

At 15 s. 1 d. per Pound, what will pay a Debt of 21 l. 17 s. 9 d. 2 f. ?

Or thus,

$$\begin{array}{r} \text{d.} \quad \text{l.} \\ 12 \overline{) 20} \quad 21.88958 \\ \underline{4} \end{array}$$

$$\begin{array}{r} \text{d.} \quad \text{l.} \\ 1 \overline{) 12} \quad 15.322706 \\ \underline{1} \quad 1.0944 \\ 0.0912 \end{array}$$

Answer l. 16.5083

$$\begin{array}{r} \text{s.} \quad \text{l.} \\ 10 \overline{) 2} \quad 21.88958 \\ \underline{2} \quad 10.94479 \\ \text{d. } 1 \overline{) 60} \quad 5.47239 \\ \underline{5} \quad .0912 \end{array}$$

Answer l. 16.50838

See Example 7, page 177;

Example

Answer 24.

Example 13.

What will a Debt of 10 l. 13 s. come to at 11 s. per l.?

$$\begin{array}{r}
 \begin{array}{cc} d. & l. \end{array} \\
 20 \overline{) 12} \begin{array}{c} 10.65 \\ .5 \end{array} \\
 \hline
 5.325 \\
 .8875 \\
 \hline
 \end{array}$$

Answer 6.2125 or 6 l. 4 s. 3 d.

Example 14.

673 Yd. at 8 d. $\frac{5}{8}$ per Yd.

Bring the price into the Decimal of a Pound; and multiply it by the Quantity, for the Answer.

$$\begin{array}{r}
 8) 5. \\
 \hline
 12) d. 8.625 \\
 \hline
 2 \overline{) 0} .71875 \\
 \hline
 \end{array}$$

Here, first I reduce the Fraction into a Decimal, as in page 193, then I fix 8 d. to the left hand, &c.

.0359375 Decimal of 8 d. $\frac{5}{8}$
 376 the Quantity reversed.

$$\begin{array}{r}
 215625 \\
 25156 \\
 1078 \\
 \hline
 \end{array}$$

Answer 24.1859 or 24 l. 3 s. 3 d. 2 f.

d. Or thus, by Vulgar Arithmetick.

$$\begin{array}{r} 4 \overline{) 6} \\ 4 \overline{) 6} \end{array} \left. \vphantom{\begin{array}{r} 4 \overline{) 6} \\ 4 \overline{) 6} \end{array}} \right\} 673 \text{ Yd. at } 8 \text{ d. } \frac{5}{8}$$

$$\begin{array}{r} 112 : - : 4 \\ f. 2 \overline{) 8} \quad 112 : - : 4 \\ g. 2 \overline{) 4} \quad 14 : - : - : 2 \\ \quad \quad 3 : 1 : - : - : \frac{2}{4} \\ \hline \text{Answ. } 24.1 : 1 : 8 : 2 \frac{2}{4} \end{array}$$

First I find what the five eighths of a penny are, by multiplying 1 *d.* by the Numerator 5, and dividing by the Denominator 8, thus:

$$1 \text{ d.}$$

$$5$$

$$8 \overline{) 5} \text{ d.}$$

$$- \text{d. } 2 \text{ f. } 2 \frac{2}{8}$$

Observe, you may find what the five eighths are, in the mind; for, first I consider the value of one eighth of a Penny, to be 2 *Q.* of a Farthing, then five of them are 2 *f.* 2 *Q.* as before. And then I work as above.

Or thus,

$$\begin{array}{r} 673 \\ 5 \\ \hline 8 \overline{) 3365} \text{ d.} \\ \hline 12 \overline{) 420} \text{ d. } 2 \text{ f. } \frac{4}{8} \\ \hline 2 \overline{) 35} \text{ s.} \\ \hline \end{array}$$

$$\text{d. } 17 \text{ ss. } 1 \text{ s. } - \text{d. } 2 \text{ f. } \frac{4}{8} \text{ Value of } \frac{5}{8}$$

For 8 — 224 : - : 8 I divide the Quantity by 8.

$$\text{Answer } 24.1 : 1 : 8 : 2 \frac{4}{8}$$

Here, I first suppose the 673 *Yd.* to be at 1 *d.* per *Yd.* and find the value of $\frac{5}{8}$ by multiplying by 5, and dividing by 8, then I reduce the Pence into *Two-shillings*; and work for 8 *d.* as usual, and add both together for the Answer.

GOLDEN



GOLDEN RULE in DECIMALS.

THE same Rule is to be observed here as in whole Numbers, both as to the stating and working of tions; only where it is convenient, the parts are reduced into Decimals; and in some Cases will be less than whole Numbers, especially where the multiplier or Divisor will be a less Number, than reduced into their lowest name.

Example 1.

s. *Yd.* 2
Yards cost 18, what will 37 : 1 cost?

Yd. 1 *Yd.*
If 4 cost .9 what 37.2 5?

$$\begin{array}{r} .9 \\ \hline 4 \overline{) 33.525} \end{array}$$

Answer 8.38 125

Or 8 l. 7 s. 7 d. 2 f.

D d

Example

Example 2.

C.

l.

C.

If 7 of Sugar cost 25, what must I give for 17

C. l. C.
If 7 cost 25, what 17.75?

$$\begin{array}{r} \text{---} 5 \text{---} \\ 88.75 \end{array} \left. \begin{array}{l} \text{---} 1. \\ \text{---} 25 \end{array} \right\}$$

$$\begin{array}{r} \text{---} \text{---} \\ 7) 443.75 \\ \text{---} \end{array}$$

Answer 63.3928

Or 63 l. 7s. 10d. 1f.

Example 3.

What must I give for 57 Yd. 3 Q. of Cloth
I give 8 l. 16s. 4d. for 18 Yards?

Yd. l. s. d. d.
4 | 60)
If 18 cost 8 : 16 : 4, what 57.75 Yd.?

$$\begin{array}{r} \text{---} \text{---} \\ 46.200 \\ 462.00 \\ .9625 \end{array}$$

$$\begin{array}{r} \text{---} \text{---} \\ 6) 509.1625 \\ \text{---} \end{array}$$

$$\begin{array}{r} \text{---} \text{---} \\ 3) 848604 \\ \text{---} \end{array}$$

Answer 28.2868

Or 28 l. 5s. 8d. 3f.

Example 4.

Yd. 2 $\mathcal{L}$ of Velvet cost 15 s. 3 d. what must
for 33 Yd. 2 $\mathcal{L}$ 3 N.?

$\mathcal{L}$. s. d. Yd. $\mathcal{L}$. N.
If 6 cost 15 : 3, what 33 : 2 : 3?

$$\begin{array}{r}
 \begin{array}{r}
 \mathcal{L} \quad s. \quad d. \\
 6 \text{ cost } 15 : 3, \text{ what } 33 : 2 : 3? \\
 \hline
 4 \qquad \qquad 4 \\
 \hline
 \text{pences } 61 \qquad \mathcal{L} \quad 134.75 \\
 \qquad \qquad \qquad \quad -6+ \\
 \qquad \qquad \qquad \quad 80850 \\
 \hline
 6) 8219.75 \\
 \hline
 8|0) 1369.958 \text{---} 3\text{-pences} \\
 \hline
 \text{Answer } 17.1244
 \end{array}
 \end{array}$$

Or 17 l. 2 s. 5 d. 3 f.

e, when you have reduced the 1st number into one
then reduce the 3d number into the same name ;
there be any of a lower Denomination in the third
er, bring it into a Decimal, as in the above Exam.

Example 5.

Yd. cost $\frac{3}{8}$ l. what is the Price of 17 Yards ?
e Vulgar Fractions being reduced into Decimals,
taught in page 193, then the stating will be thus:

Yd. l. Yd.
If $\frac{3}{8}$ cost .375, what 17?

$$\begin{array}{r}
 17 \\
 \hline
 .8) 6.375 \\
 \hline
 \end{array}$$

Answer 7.96875 or 7 l. 19 s. 4 d. 2 f.

Example 6.

What will 37 Yd. 3 Q. 2 N. of Cloth come
if I give 4 l. for 17 Yards?

Yd. 1. 1. Yd. 1.
If 17 cost 4, what 37.875?

4

17) 151.5000 (8.9117 Ans

Or,

155 8 l. 18 s. 2 d.

.20

.30

EXAMPLE 7.

If I give 4 l. 10 s. for 1 C. of Tobacco, what
Quantity can I have for 96 l. 13 s. 5 d. 2 f.?

l. s. C. l. s. d. f.

If 4 : 10 buy 1, what 96 : 13 : 5 : 2?

20

20 s.

90 s.

9|0) 5.1933.4583

Answer C. 21.48287 or 21 C. and 54

—48287

48287

48287

lb. 54.08144

Here, the first Number being reduced into Shilling
I also reduce the third Number into the same, and
odd Money I bring into the Decimal of a Shilling.

Example

Example 8.

To what comes my Commission for the Sale of
 79 l. worth of Goods, sent by my Employer, who
 allows me 12 l. per Cent or per 100 l. ?

l. l. l.
 If 100 require 12, what 679 ?

$$\begin{array}{r} 12 \\ \hline 100 \overline{) 81.48} \text{ Answer} \end{array}$$

Or 81 l. 9 s. 7 d.

Here 100 being the *Divisor*, I only set the prop-
 10 figures nearer the left hand, as was taught in
 page 191.

Example 9.

At 3 l. 10 s. per Cent, to what comes the Com-
 mission of 475 l. 17 s. ?

l. l. l.
 If 100 require 3.5, what 475.85 ?

$$\begin{array}{r} 7 \\ \hline 333.095 \end{array} \left. \vphantom{\begin{array}{r} 7 \\ \hline 333.095 \end{array}} \right\} 3.5$$

16.65.4.75 Answer,

Or 16 l. 13 s. 1 d.

Example

Example 10.

What's the Insurance of 346*l.* 18*s.* at 13*l.* 3*s.* per Cent?

$$\begin{array}{r}
 \text{l.} \quad \text{l.} \quad \text{s.} \quad 5 \overline{) 1} \quad \text{l.} \\
 100 \text{ --- } 13 : 5 \text{ --- } 346.8 \\
 \quad \quad \quad 131 \\
 \quad \quad \quad 1040.4 \\
 \quad \quad \quad 86.7 \\
 \hline
 \end{array}$$

45.95.1 Answer,

Or 45*l.* 19*s.* — 2*d.* 1*f.* near.

Example 11.

At 7 Guineas per Cent what comes the Insurance of 892*l.* 17*s.* to?

$$\begin{array}{r}
 \text{l.} \quad \text{l.} \quad \text{s.} \quad 1 \overline{) 20} \quad \text{l.} \\
 100 \text{ --- } 7 : 7 \text{ --- } 892.85 \\
 \quad \quad \quad 73 \\
 \hline
 \quad \quad \quad 267.855 \\
 \quad \quad \quad 6249.95 \\
 \quad \quad \quad 44.6425 \\
 \hline
 \end{array}$$

65.62.4475 Ans. 65*l.* 12*s.* 5*d.* 3*f.*

Example

Example 12.

What's the Commission of 184 : 17, at 2 : 15 per Cent?

$$\begin{array}{r}
 \begin{array}{ccccc}
 & & s. & & \\
 l. & l. & s. & 1 | 20 & l. \\
 100 & 2 : 15 & & 184.85 & \\
 & & & 2.7 & \\
 \hline
 & & & 129.395 & \\
 & & & 369.70 & \\
 & & & 9.2425 & \\
 \hline
 & & & 508.3375 &
 \end{array}
 \end{array}$$

508.3375 *Answer*. 5 l. 8 s. 8 d.

Example 13.

What will 4796 plain Tiles come to, at 17 s. 6 d. per 1000?

$$\begin{array}{r}
 \begin{array}{ccccc}
 & & s. & d. & \\
 Tiles. & s. & d. & 2 : 6 | 8 & Tiles. \\
 \text{If 1000 cost } 17 : 6, \text{ what } 4796? & & & & \text{Product by } 1 l. \\
 & & & 5995 & \text{Subtract.} \\
 \hline
 \end{array}
 \end{array}$$

Answer 4.196.5 or 4 l. 3 s. 11 d.

Here, first I suppose the price of one to be 1 l. then 4796 Tiles will be as many Pounds, but the price being but 17 s. 6 d. I work for 2 s. 6 d. and Subtract; then divide by 1000 for the *Answer*.

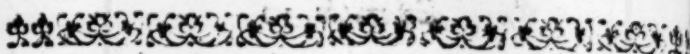
Example 14.

45874 Grey Stock Bricks at 18 s. per 1000.

If 1000 cost 18 s. what 45874?

Answer 41.286,6 or 41 l. 5 s. 8 d. 3 f.

TARE



TARE and TRET.

TARE and TRET are allowances made to Merchants, &c. in buying their Goods.

TARE is the weight of the thing, which holds the Goods.

TRET is an allowance for the Waste or Dirt, that is mixed with the Commodity, and is 4 lb. for every 104 lb. of Goods.

Note. The whole weight, before any allowances are made, is called *Gross*; when part of the allowances are made, what remains is *Sutle*; but when all allowances are made, what remains is *Net weight*.

CASE I.

When the Tare is so much in the whole.

R U L E.

Subtract the Tare from the Gross, and what remains will be Net weight.

Example

EXAMPLE

Gross 467 C. 1 $\mathcal{Q}$. 3 lb. the weight of the
heads or Tare 14 C. 3 $\mathcal{Q}$. 15 lb. what is the
weight; that is, the weight of the Commodity?

	C.	$\mathcal{Q}$.	lb.
Gross	467	:	1 : 3
Tare	14	:	3 : 15

the weight of the Commodity 452 : 1 : 16

CASE 2.

When the Tare is so much *per* Bag or Chest, &c.
find the Net weight.

RULE.

Find the Tare of all the Bags, &c. (by multiplying
the Tare allowed for one Bag, &c. by the Number
of Bags, &c.) which Subtract from the Gross for
the Net weight.

E c

Example

Example 1.

What is the Net weight of 9 Hogsheds of Ind weighing 46 C. 3 Q. 14 lb. Gross; the weight every Hogshed or Tare is 16 lb.?

16 Tare in 1 Hd.

9 Hd.

Gross 46 : 3 : 14
Tare 1 : 1 : 16

112) 144 (1 C.

Net weight 45 : 1 : 16

rem. 32 lb. or 1 Q. 4 lb.

Observe, if the Net was to be given in lb. work

16 lb. Tare in 1 Hd.

9 Hd.

C. Q. lb.

46 : 3 : 14

46

144 lb. Tare in all.

46

46

84 lb. or 3 Q.

14 lb.

5250 lb. Gross.

144 lb. Tare.

Answer 5106 lb. Net.

Example 2.

What is the Net weight of 13 Bags of Cotton weighing 29 C. 3 Q. Tare 9 lb. 2 q. per Bag

lb.

9.5 Tare in 1 Bag.

13 Bags.

C. Q. lb.

Gross 29 : 3 : 14

Tare 1 : 1 : 16

112) lb. 123.5 (1 C.

Net 28 : 2 : 14

lb. 11.5 rem.

C A S E 3.

When the Gross of one Bag or Hoghead, &c. is given, and its Tare, to find the Net weight of several Bags or, &c. of the same weight.

R U L E.

First find the Net of one Bag, or Hoghead, &c. then multiply by the number of Bags or, &c. for the

Example 1.

What is the Net Weight of 8 Frails of Raisins, each weighing Gross 3 C. 2 Q. 12 lb. Tare 20 lb. per Frail?
20 lb. Tare in 1 Frail, Sub-
[trailed.

3 : 1 : 20 Net in 1 Frail.
8 Frails.

Answer 27 : 1 : 20

Example 2.

How many C. Net are there in 17 Frails of Raisins, weighing Gross 2 C. 3 Q. 18 lb. Tare, 15 lb. 1 q. per Frail?
15 : 1 q. Tare in 1 F.

2 : 3 : 2 : 3 Net in 1 Frail
~~8~~

22 : — : 22 : —
22 : — : 22 : —

Answer 47 : — : 18 : 3

is multiplied by 17 Frails, as is taught in page 82.

Example

Example 3.

How many *lb.* Net are there in 19 Chests of Spice each weighing 3 C. 2 Q. 12 *lb.* Tare 18 *lb.* 3 *q.* per Chest?

$$\begin{array}{r} 3 \\ 3 \\ 56 \text{ lb. or } 2 \text{ Q.} \\ 12 \text{ lb.} \end{array}$$

$$\begin{array}{r} 404 \text{ lb. Gross.} \\ 18.75 \text{ Tare.} \\ \hline 385.25 \text{ Net.} \\ 19 \text{ Chests.} \end{array} \left. \vphantom{\begin{array}{r} 404 \\ 18.75 \\ 385.25 \\ 19 \end{array}} \right\} \text{ in 1 Chest.}$$

Answer *lb.* 7319.75

Example 4.

What is the Net weight of 4 Bags of Cotton Wool as under, and what will it come to, at 8 *d.* 2 *f.* per *lb.*

No.	lb.	q.		lb.	q.
1	255	: 2	} Tare	11	: 1
2	415	: 3		13	: 2
4	613	: 1		16	: —
9	362	: —		12	: 3

$$\begin{array}{r} \text{Gross } 1646 : 2 \\ \text{Tare } 53 : 2 \end{array}$$

$$53 : 2 \text{ Tare.}$$

$$\begin{array}{r} d. 4 \mid 6 \} \\ d. 4 \mid 6 \} 1593 : — \text{ Net at, \&c.} \end{array}$$

$$\begin{array}{r} f. 265 : 1 \\ 2 \mid 8 \} 265 : 1 \\ 33 : — : 3 \\ 1 : 2 \} \end{array}$$

Answer 56.4 : — : 4 : 2

Example

CASE 4.

When the Tare is so much per Score.

R U L E.

Find the Tare by the GOLDEN RULE ; then Subtract
from the Gross, and what remains will be Net.

Example 1.

What is the Net weight of four Bags of Wooll
weighing as under, viz.

	<i>lb.</i>	
No. 1	234	} Tare 1 of a <i>lb.</i> per score
3	164	
4	311	
5	216	

give 1 Tare, what 925 *lb.* Gross ?

1 *q.*

number 20 } 80) 925 *q.* Here instead of dividing
4 } by 20 the first num-

Tare *lb.* 11.5625 ber, and then by 4

Net *lb.* 913.4375 to bring the *Q.* in-

Product of those two
numbers, viz. by 80.

serve, the like in other Examples.

Example

Tare and Tret.

Example 2.

Gross 16 : 2 : 16, Tare 2 of a lb. per Score, how many lb. Net?

$$\begin{array}{r}
 \text{lb. } 20 - 2 \text{ Tare} \\
 \hline
 18
 \end{array}
 \qquad
 \begin{array}{r}
 \text{C. } 2 \text{ lb.} \\
 16 : 2 : 16 \\
 \hline
 16 \\
 16 \\
 \hline
 32 \\
 16 \\
 \hline
 16
 \end{array}$$

$$\begin{array}{r}
 10 \} 40 \text{) } 1864 \text{ lb. Gross} \\
 4 \} \\
 \hline
 \text{Subtract } 46.6 \text{ Tare} \\
 \hline
 \text{lb. } 1817.4 \text{ Net.}
 \end{array}$$

Example 3.

How many C. Net are there in 9 : - : 18, Tare 3 q. of a lb. per Score?

$$\begin{array}{r}
 \text{lb. } 20 - 3 \text{ Tare} \\
 \hline
 17
 \end{array}
 \qquad
 \begin{array}{r}
 \text{C. } 2 \text{ lb.} \\
 9 : - : 18 \\
 \hline
 9 \\
 9 \\
 \hline
 18
 \end{array}$$

$$\begin{array}{r}
 1026 \text{ lb. Gross.} \\
 3 \text{ q.} \\
 \hline
 80 \text{) } 3078
 \end{array}$$

$$\begin{array}{r}
 \text{lb. } 38.475 \text{ Tare Subtract} \\
 \hline
 \text{Net lb. } 987.525 \text{ (8 : 3 : 7.525)} \\
 \hline
 \text{Remains lb. } 91.525 \text{ or } 3 : 7.525
 \end{array}$$

Or when the *Answer* is to be given in *C.* you may work thus ;

<i>lb.</i>	<i>q.</i>	<i>C.</i>	<i>℥.</i>	<i>lb.</i>
20	3	Gross	9	: 18
				3
80 { 10) 27 : 1 : 26				
8) 2 : 2 : 27.8				
Tare — : 1 : 10.475				
Net weight 8 : 3 : 7.525				
As before.				

Example

Tare and Tret.

Example 4.

What is the Net weight in C. of 21 : ^{C. 2.}
Tare 1 lb. 1 q. per Score?

If lb. $\begin{array}{r} 5) \quad 20 \\ \hline 4 \end{array}$ $\begin{array}{r} 5) \quad 59 \\ \hline 1 \end{array}$ $\begin{array}{r} C. \quad 2. \quad lb. \\ 21 : - : 24 \\ 21 \\ 21 \\ 2124 \end{array}$

Example 5.

How many *lb* Net are there in *C. 2. lb.* 16 . 3 . 5, Tare
lb. 1 q. per Score?

$$\begin{array}{r} \text{lb.} \quad \text{q.} \quad \text{C.} \quad \text{2.} \quad \text{lb.} \\ 20 \text{ --- } 9 \text{ --- } 16 : 3 : 5 \end{array}$$

$$\begin{array}{r} 16 \\ 16 \\ 1684 \\ 5 \end{array}$$

$$\begin{array}{r} 1881 \text{ lb. Gross.} \\ 9 \text{ q.} \end{array}$$

$$\begin{array}{r} 20 \left\{ \begin{array}{l} 80) \\ 4 \end{array} \right. \begin{array}{r} 16929 \text{ q.} \\ \text{---} \\ 211.6125 \text{ Tare} \end{array} \end{array}$$

Answer lb. 1669.3875

you wou'd give the *Answer* in *C* work thus;

$$\begin{array}{r} \text{lb.} \quad \text{q.} \quad \text{C.} \quad \text{2.} \quad \text{lb.} \\ \text{If } 20 \text{ --- } 9 \text{ --- } 16 . 3 : 5 \\ 9 \end{array}$$

$$\begin{array}{r} 30 \left\{ \begin{array}{l} 10) 151 : - : 17 \\ 8) 15 : - : 129 \end{array} \right. \end{array}$$

$$\text{Tare } 1 : 3 : 15.6125$$

$$\text{Answer } 14 : 3 : 17.3875$$

F f

Example

Tare and Tret.

Example 6.

When the Tare is 2 lb. 2 q. per Score; what is the Net weight of 13 C. 3 Q. 4 lb.?

$$\begin{array}{r} 10 \mid 10 \mid C. \quad 2 \quad lb. \\ \text{If } 20 \text{ lb.} - 10 \text{ q.} - 13 : 3 : 4 \\ \hline 2 \qquad 1 \qquad 13 \end{array}$$

$$\begin{array}{r} 13 \\ 1384 \\ 4 \end{array}$$

$$\begin{array}{r} 2 \} \text{---} \\ 8 \mid 1544 \text{ lb. Gross.} \\ 4 \} \text{---} \end{array}$$

193 lb. Tare.

112) 1351 lb. Net (12 C. — 2. 7 lb.)

$$\begin{array}{r} \text{---} \\ 231 \end{array} \quad \text{Answer.}$$

Remains 7 lb.

$$\begin{array}{r} 10 \mid 10 \mid C. \quad 2 \quad lb. \\ \text{If } 10 \text{ lb.} - 20 \text{ q.} - 10 \text{ ---} - 13 : 3 : 4 \text{ Gross.} \\ \hline 2 \qquad 1 \qquad 8 \mid \text{---} \end{array}$$

1 : 2 : 25 Tare.

12 : — : 7 Net.

CASE

C A S E 5.

When the Tare is so much per C. and the Net weight required in lb.

R U L E.

First find the Net weight of 1 C. (by Subtracting the Tare of 1 C. from 112 lb.) then find by the Golden Rule, how many lb. Net there are in all the Q. and lb.

Example 1.

C. Q. lb. lb.
 7 : 1 : 21, Tare 13 per C. how many lb. Net?

lb.
 112
 Tare 13
 C. ————— C.
 1 — Net 99 ————— 7.4375
 99 lb.

66 9375
 669 375

Answer lb. 736.3125

Or 736 lb. and rather more than 1 Q.

Or

Tare and Tret:

Or thus,

Multiply the Net weight of 1 C. by the Number of C. and for the odd weight take the part or parts of the Net of 1 C.

2. lb.
14) 99 Net in 1 C.
7 C.

lb. 693
14 | 2) 24.75
7 | 2) 12.375
6.1875

Answer lb. 736.3125 as before.

Example 2.

C. 2 lb. . lb.

Gross 13 : 2 : 15, Tare 11 per C. how many lb. N

C. lb C.
1--101 Net- 13.6339
~~101~~
1363 39

Answer lb. 1377.0239

2. Or thus,
2 | 2) 101 lb. Net in 1 C.
13 C.

lb.

8	7	}	-	1313
7	8			505
				7.214
				6.312

Answer lb. 1377.026

Exam

Tare and Tret.

245

Example 3.

C. 2 lb.

Gross 9 : 3, Tare 12 per C. how many lb. Net ?

C. lb. C.
If 1 — 100 Net — 9.75
9 75 lb. Answer.

Or thus,

2 lb.
2 | 2) 100 Net in 1 C.
9 C.

2 900
1 | 2) 50
25

Answer 975 lb.

Example 4.

C. 2 lb. lb.

Gross 9 : 1 : 10, Tare 24 per C. how many lb. Net ?

lb.

112

24 Tare

Or thus,

C. lb. C.
If 1 — 88 Net — 9.3928 *2 lb.*
reversed .88 *lb. 16 | 4 } 88 N. in 1 C.*
9 C.

7514

751

792

22

12.57

Answer lb. 826.5

lb. 826.57 Answer.

In these Examples if there be but one place of Decimals, the Answer will be exact enough; therefore you may reverse the Multiplier, and place it so as to have one Decimal place, as in the Example above.

Example

Example 5.

Reduce the Net weight of 56 C. 3 Q. 16 lb. Gross into Gallons, each Gallon containing 7 lb. 2 q. and the Tare being 18 lb. per C.

C.	lb.	C.	
If 1	94	Net	56.8 928
			.49 reversed.
			51203 2276
lb.	q.	gal.	
If 7	2	1	lb. 5347.9 Net:
4 q.			4 q.
30 q.			3 0) 2139 1.6 q. gal. 713.05

Answer 713 Gallons, and the Decimal being valued will be near a half pint.

Example 6.

How many lb. Net are there in 3 Bags of Cotton Wooll weighing as under, Tare 5 lb per C.

C	Q.	lb.	C.	lb.	C.
No. 1	2	1	107	Net	9.17 85
2	3	1			107
4	3	2			64 2495
					9 : - : 20 Gross.
					<i>Answer</i> lb. 9 82.0995

Note. After you have made an allowance for Tare or the thing which the Goods are contain'd in, if there be Tret allowed, it's allowance must be thus made : as there are 4 lb. allowed for 104 lb. so in every 104 lb. there are 100 lb. Net; therefore by the Golden Rule say, if 104 lb. produce 100 lb. Net, how many lb. Net will the Suttle produce.

Example 7.

How many *lb.* Net are there in 4 Frails of Copper, *viz.*

		<i>C. 2. lb.</i>	
<i>No.</i>	<i>1</i>	<i>7 : 1 : 12</i>	
	<i>3</i>	<i>9 : 3 : —</i>	
	<i>4</i>	<i>5 : 1 : 13</i>	
	<i>6</i>	<i>3 : — : 16</i>	

lb. *lb. lb.*

Total Gros 25 : 2 : 13 Tare 21 per *C.* Tret 4 in 104

112 *lb.*

21 Tare

C. *C.*
 1 — Suttle 91 — 25.616 Gros;

91

2305 44

lb.

4 — 100 Net — 2331 05 6 Suttle:

104) 2331 05.6 (2241.4 *lb.* Net *Ans.*

.251

.430

.145

.416

...

Or

Or you may find the Net thus :

When you have found the Suttle, divide it by 26 because 4 lb. is the 26th part of 104 lb. ; and it gives the Tret, which Subtract from the Suttle, and you have the Net.

$$\begin{array}{r}
 \text{lb. Suttle } 2331.0 \text{ Suttle.} \\
 26) 2331.056) \quad 89.6 \text{ Tret Subtract.} \\
 \hline
 251 \quad \text{lb. } 2241.4 \text{ Net as before.} \\
 \hline
 170
 \end{array}$$

Note, When the Net weight is to be given C. work as before, and then reduce the lb. into

Example 8.

Gross 8 C. 2 Q. Tare 10 lb. per C. how many C. Net

$$\begin{array}{r}
 \text{C.} \quad \text{lb.} \quad \text{C.} \\
 1 \text{ --- } 102 \text{ Net --- } 8.5 \\
 \hline
 170 \\
 \hline
 \text{C. } 2 \text{ lb.} \\
 \text{Answer } 7 : 2 : 27 \quad 112) \text{ lb. } 867.0 \\
 \hline
 83 \text{ lb.} \\
 2 \text{ Q. } 27
 \end{array}$$

Exam

Example 9.

How many C. Net are there in 4 Hogsheds of Tobacco, weighing Gross 25 C. 1 Q. 18 lb. Tare 7 lb. per C. and Tret 4 lb. in 104 lb. ?

C.	lb.	C.	
— 95 Suttle —		25.4 107 Gross.	
		.59 reverted.	
	228 70		
	12 70	lb.	
		24 14.0 Suttle.	
26)	24 14.0 Suttle)	92.3 Tret.	
C.	Q.	lb.	.74
Ans. 20 :	2 :	25.2	
		220	
		112)	2321.2 Net (20
			Q. lb.
			81.2 or 2:25.2
			lb.

Example 10.

Gross 16 C. 2 Q. 19 lb. Tare 9 lb. per C. how many C. Net ?

C.	lb.	C.	
— 103 Net —		16.66 96	
		.30 + reverted.	
		500	
112)	lb.	17 16.9	Net (15 C.
		.596	
		Q. lb.	
Rem. lb.		.36.9	or 1:8.9
		C.	Q.
		lb.	
Answer	15 :	1 :	8.9
G	g		

Example

Example 11.

How many C. Net are there in 5 Bags
Hops, each weighing 2 C. 3 $\mathcal{Q}$. 12 lb. Gross, Ta
15 lb. per C. ? 5 Bags.

$$\text{C. } 14 : 1 : 4 \text{ Gross.}$$

$$\begin{array}{r} \text{C.} \quad \text{lb.} \quad \text{C.} \\ 1 \text{ --- } 97 \text{ Net --- } 14.2 \text{ 857} \\ \quad \quad \quad .79 \text{ reversed.} \end{array}$$

$$\begin{array}{r} 12857 \\ 1000 \end{array}$$

$$112) \text{ lb. } 1385.7 \text{ Net (12 C.}$$

$$\begin{array}{r} .265 \end{array}$$

$$\text{Rem. lb. } 41.7 \text{ or } 1 : 13.7$$

$$\begin{array}{r} \text{C.} \quad \mathcal{Q}. \quad \text{lb.} \\ \text{Answer } 12 : 1 : 13.7 \end{array}$$

Or, when the Net weight is to be given in
work thus, viz. Take such a part of the Gross,
the Tare is of a C. and the Quotient will be the Ta
which Subtract from the Gross, for the Net.

Exam

Example 12.

Gross 16 : 3 : 14, Tare 14 per C. how many C. Net?

lb. C. Q. lb.
14|8) 16 : 3 : 14. Gross.

2 : — : 12.25 Tare.

Answer 14 : 3 : 1.75 Net.

Example 13.

Gross 9 : 1 : 18, Tare 16 per C. how many C. Net?

lb. C. Q. lb.
16|7) 9 : 1 : 18 Gross.

1 : 1 : 10.57 Tare.

8 : — : 7.43 Net.

Example

Example 14.

How many C. weight Net are there in 5 Bags
Hops, each weighing 2 C. 3 Q. 12 lb Tare 15
per C. ? 5 Bags.

$$\begin{array}{r} \text{Q.} \quad \underline{\hspace{2cm}} \\ 2 \mid 2) \quad 14 : 1 : 4 \text{ Gross} \end{array}$$

$$\begin{array}{r} 16.8 \mid 7 \} \\ 2 \mid 8 \} \quad \underline{\hspace{2cm}} \quad 7 : - : 16 \end{array}$$

$$\begin{array}{r} 1 : - : 2.28 \\ - : 3 : 16. \end{array} \left. \vphantom{\begin{array}{r} 1 : - : 2.28 \\ - : 3 : 16. \end{array}} \right\} \text{ added}$$

$$\begin{array}{r} 1 : 3 : 18.28 \text{ Tare S} \\ \underline{\hspace{2cm}} \text{ from the} \\ 12 : 1 : 13.72 \text{ Net.} \\ \underline{\hspace{2cm}} \end{array}$$

See Example 11, page 250.

Exam

How
Tobacco
and Tret

No. 1

2

3

Gross
Tare

Suttle

12

12

26) 136

.6

Example 15.

How many C. Net are there in 3 Hogsheads of Tobacco, whose Gross weight and Tare are as under, and Tret 4 lb. in 104 lb.

	C. Q. lb.		C. Q. lb.
No. 1	6 : - : 24	Tare	- : 3 : -
2	4 : 1 : 12		- : 2 : 14
3	3 : 1 : 18		- : 1 : 24
Gross	13 : 3 : 26		1 : 3 : 10 Tare.
Tare	1 : 3 : 10		

Suttle 12 : - : 16

12

12

12

16 lb.

C. Q. lb.

lb. 12 : - : 16 Suttle.

26) 1360.0 (52.3 or 1 : 24.3 Tret Subtract.

.60

Answer 11 : 2 : 19.7 Net.

.80

Of



Of Interest.

INTEREST is that which is paid for the use of Money, and is of two kinds, *Simple* and *Compound*.

Simple Interest is that which is paid for the Principal or Sum of Money lent, and is 5 *l.* or 6 *l.* or any other Sum for the use of 100 *l.* for one Year, and more or less proportionably for greater or lesser Sums, and for more or less time, agreed on by the Parties.

Compound Interest is that which is paid for the Principal and its Interest put together; that is, when Interest on Money becomes due and not paid, the same Rate is allowed on the unpaid Interest as was before on the Principal, and is therefore called *Compound Interest*, or *Interest upon Interest*.

Simple Interest:

CASE I.

To find the Interest of any Sum of Money for one Year.

R U L E.

Multiply the Sum given by the Interest of 100 for 1 Year, which at

$$\begin{array}{rcl} \text{\textit{l.}} & \text{\textit{s.}} & \\ 6 & & \\ 5 & & \\ 4 : 10 & \left. \vphantom{\begin{array}{c} 6 \\ 5 \\ 4 : 10 \end{array}} \right\} \text{per Cent, is} & \left\{ \begin{array}{l} .06 \\ .05 \\ .045, \&c. \end{array} \right. \end{array}$$

This is found by dividing the rate of Interest by 100; for if 6 *l.* or 5 *l.* &c. be the Interest of 100 certainly the 100 part must be the Interest of 1 *l.*

Example

What
5 *l.* per

What?
at 4 *l.* 10

Answer 10

Or

To find

Find the
last Case;
and if ther
Interest for

Example 1.

What is the Interest of 67 l. 10 s. for 1 Year, at 5 l. per Cent?

$$\begin{array}{r} \text{l.} \\ 67.5 \\ .05 \end{array} \text{ Interest of 1 l. for 1 Year.}$$

Answer 3.375

Or 3 l. 7 s. 6 d.

Example 2.

What's the Interest of 234 l. 17 s. for 1 Year, at 4 l. 10 s. per Cent?

$$\begin{array}{r} \text{l.} \\ 234.85 \\ \hline 211365 \\ 5 \end{array} \left. \begin{array}{l} 9 \\ 5 \end{array} \right\} .045 \text{ Interest of 1 l. for 1 Year.}$$

Answer 10.56825

Or, 10 l. 11 s. 4 d. 1 f.

C A S E 2.

To find the Interest of any Sum for any time.

R U L E.

Find the Interest of the Sum for 1 Year, as in the first Case; then multiply that by the Number of Years; and if there be any Months, take parts out of the Interest for 1 Year.

Example

Example 1.

What is the Interest of 425 *l.* 15 *s.* for 7 Years
at 5 *l.* per Cent, per Annum?

$$\begin{array}{r}
 \text{£} \\
 425.75 \\
 .05 \\
 \hline
 21.2875 \text{ Interest for 1 Year:} \\
 7 \text{ Years.} \\
 \hline
 \end{array}$$

Answer 149.01 25

Or 149 *l.* — *s.* 3 *d.*

Example 2.

What's the Interest of 67 *l.* 10 *s.* for 7 Months,
5 *l.* per Cent, per Annum?

$$\begin{array}{r}
 \text{£} \\
 67.5 \\
 .05 \\
 \hline
 \text{M.} \\
 6 \mid 2) - 3.375 \text{ Interest for 1 Year.} \\
 \hline
 1 \mid 6) - 1.6875 \\
 .28125 \\
 \hline
 \end{array}$$

Answer 1.96 875

Or 1 *l.* 19 *s.* 4 *d.* 2 *f.*

What's
months, at

What will
5 Months

Answer

serve, W
ney, its o
e.

Exam

Simple Interest.

257

Example 3.

What's the Interest of 258*l.* for 9 Years, and 2 Months, at 4*l.* per Cent, per Annum?

$$\begin{array}{r}
 \textit{l.} \\
 258 \\
 .04 \\
 \hline
 \text{M.} \quad \text{---} \\
 2 \overline{) 10.32} \quad \text{Interest for 1 Year,} \\
 \quad \quad \quad 9 \text{ Years.}
 \end{array}$$

$$\begin{array}{r}
 92.88 \quad \text{Interest for 9 Years,} \\
 1.72 \quad \text{for 2 Months,} \\
 \hline
 \end{array}$$

Answer 94.60

Example 4.

What will 84*l.* 10*s.* Amount unto in 5 Years, 5 Months, at 6*l.* per Cent, per Annum?

$$\begin{array}{r}
 \textit{l.} \\
 84.5 \\
 .06 \\
 \hline
 \text{M.} \quad \text{---} \\
 4 \overline{) 3} - 5.070 \quad \text{Interest for 1 Year,} \\
 \quad \quad \quad 5 \text{ Years.}
 \end{array}$$

$$\begin{array}{r}
 25.35 \\
 1 \overline{) 4} - 1.69 \\
 \quad \quad .4225
 \end{array}$$

$$\begin{array}{r}
 27.4625 \quad \text{Interest.} \\
 84.5 \quad \quad \text{Principal.} \\
 \hline
 \end{array}$$

Answer 111.9625 the Amount.

Observe, When you find the Amount of any Sum of Money, its only adding the Principal to the Interest, &c.

H h

Note,

Note, If you wou'd find the Interest of any Sum for any Number of Days, you may work by following.

R U L E.

First find the Interest for 1 Year; then find the Interest for 1 Day by dividing by 365, and multiply that Quotient by the number of Days for the *Answer* or multiplying the Interest for 1 Year by the Days first, and then dividing by 365 will give the *Answer*.

E X A M P L E.

What's the Interest of 74*l.* 16*s.* for 51 Days at 5*l.* per Cent, per Annum?

$$\begin{array}{r}
 \text{£} \\
 74.8 \\
 .05 \\
 \hline
 3740 \text{ Interest for 1 Year.} \\
 -51 \text{ Days.} \\
 1870 \\
 \hline
 365 \overline{) 190.7400} (.5225 \text{ or } 10 \text{ s. } 5 \text{ d. } 1 \text{ f. } \textit{Answer} \\
 \hline
 .824 \\
 \hline
 .940 \\
 \hline
 2100
 \end{array}$$

Compu

In these Ex
Multipli
imal plac
ted that

Compound Interest.

Being spoken of in page 254, I shall proceed directly
the

R U L E.

Find the Amount for 1 Year (by first finding the
Interest, and to that adding the Principal as is directed
page 257) after this manner find the Amount of
this Amount for the second Year, and so on for any
number of Years.

Example 1.

What will 420 l. 17 s. Amount unto in 3 Years,
5 l. per Cent, per Annum?

l.

Multiplier reversed	420.8500	} added
First Years Interest	50.21.0425	

The Amount	441.8925	} added
Second	50.22.0946	

The Amount	463.9871	} added
Third	50.23.1993	

The Amount 487.1864 *Answer.*

Or 487 l. 3 s. 8 d. 3 f. very near.

In these Examples for brevity sake, you may reverse
Multipliers and place them so as to have four
decimal places; but take care that the Products are so
placed that the props will be under one another.

Example

Example 2.

What will 65 *l.* 14 *s.* Amount unto in 5 Years
at 6 *l.* per Cent, per Annum?

	1.	
	65.700 0	} added
	60.	
First Years Interest	3.942 0	
The Amount	69.642 0	} added
	60.	
Second	4.178 5	
The Amount	73.820 5	} added
	60.	
Third	4.429 2	
The Amount	78.249 7	} added
	60.	
Fourth	4.695 0	
The Amount	82.944 7	} added
	60.	
Fifth	4.976 7	
The Amount	87.921 4	

Note, When there are parts of a Year, find the Interest of the last Amount for 1 Year, and work for the parts as in *Simple Interest*; then the parts added to the last Amount give the *Answer*.

Example

Compound Interest.

261

Example 3.

What's the Amount of 184*l.* 17*s.* if it continue at Interest 7 Years, and 2 Months, at 4*l.* per Cent, per Annum?

1. 184.8500

First Years Interest 7.3940

The Amount 192.2440

Second 7.6898

The Amount 199.9338

Third 7.9973

The Amount 207.9311

Fourth 8.3172

The Amount 216.2483

Fifth 8.6499

The Amount 224.8982

Sixth 8.9959

The Amount 233.8941

Seventh 9.3558

The Amount 243.2499

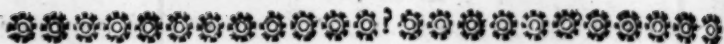
M. 9.7300

Int. of the Am. for 1 Y.

1.6216 Int. for 2 Mo. added

to the Amount of 7

Answer 244.8715 Years gives the Answer.



Discount or Rebate.

DISCOUNT or REBATE is, when a Sum of Money due at any time to come is satisfied by the payment of such a lesser Sum, as being put out at Interest at the same rate and for the same time as was Rebated, will be the same as the Sum first due; for 100 *l.* put out to Interest for one Year at 5 *l.* per Cent, will be worth 105 *l.* at the Years end; therefore 105 *l.* due at a Years end is worth only 100 *l.* present Money and the Discount is 5 *l.* which is one Years Interest of 100 *l.* not of 105 *l.*

CASE I.

Discount at Simple Interest:

R U L E.

Find the Amount of 1 *l.* for the time proposed, and make that your Divisor; by which divide the Sum to be Discounted, and the Quotient gives the *Answer*.

Note, This Rule being the reverse to *Simple Interest*, it may serve as a Proof.

Example

Example 1.

What present Money must I receive for 70 : 17 : 6,
due at the end of one Year, Discounting after the
rate of 5 *l.* per Cent?

The Amount of 1 for 1 Y. is 1.05) 70.875 (67.5 *Answer.*

. 7 87

. 5 25

...

Example 2.

What present Money must I receive for 574 : 15 : 3,
due 7 Years hence, allowing Rebate after 5 *l.* per
Cent, per Annum?

.05
Years 7

l. 1.35) *l.* 574.7625 (*l.* 425.75 *Answer.*

. 34 7

. 7 76

1 012

. 6 75

...

Example

Example 3.

What present Money will pay a Debt of 111 : 19 : 3,
due 5 Years, and 5 Months hence, allowing Discount,
at 6 l. per Cent, per Annum?

M.

4 | 3) .06
5 Years

.30
1 | 4) .02
.005

l. 1.325) 111.9625 (84.5 Answer.

.5962

.6625

....

The 3 last Ex. are Proofs to Exam. $\left\{ \begin{array}{l} 1 \\ 1 \\ 4 \end{array} \right\}$ page $\left\{ \begin{array}{l} 255. \\ 256. \\ 257. \end{array} \right.$

C A S E

CASE 2.

Discount at Compound Interest.

RULE.

Find the Amount of 1 *l.* and it's Interest, for Year; then find the Amount of that Amount for the second Year, and so on for any number of Years; then make the last Amount your Divisor, by which divide the Sum to be Discounted, and the Quotient is the present Money.

Note. By this Rule you may prove the Examples of Compound Interest.

Example and Proof to Example 1, in page 259.

What present Money will pay a Debt of 487 *l.* 3 *s.* 3 *d.* due 3 Years hence, Discounting after 5 *l.* Cent, per Annum?

$$\begin{array}{rcl}
 \text{First Year} & 1.05 \text{ the Amount of } 1 \text{ } l. & \\
 & \begin{array}{r} \cancel{1.05} \\ .05 \text{ } 25 \\ \hline \end{array} & \\
 \text{Second} & \begin{array}{r} 1.10 \text{ } 25 \\ \cancel{1.05} \\ .0551 \text{ } 25 \\ \hline \end{array} & \\
 \text{Third} & \begin{array}{r} 1.1576 \text{ } 25 \end{array} & \begin{array}{r} l. \\ 487.1864588888 \text{ } (420.8499 \\ \hline .2413645 \text{ } \text{Or,} \\ \hline .09839588 \text{ } 420 \text{ } l. \text{ } 17 \text{ } s. \\ \hline .5785888 \text{ } \text{very near.} \\ \hline 11553888 \\ \hline 11352638 \end{array}
 \end{array}$$



Fellowship.

WHEN two or more Persons join their Stock and Trade together in Company, this Rule shews how to distribute unto every one his Gain or Loss proportionally, and admits of two Cases, Single and Double Fellowship.

C A S E I.

Single FELLOWSHIP

Is when Persons Trade together, and their Stock continue one as long as another in Company, divided their Gain or Loss in proportion to their part of Stock.

Also by this Rule a Bankrupt's Estate may be divided among his Creditors, and Legacies, &c. as is justed in Case of a deficiency of Effects, and several other things.

R U L E.

First find by the Golden Rule what they Gain or Lose, &c. per Pound; then multiplying this by the number of Pounds each puts into the Stock gives the Gain or, &c. which falls to every Man.

Exam

Three A

A.
B.
C.

the whole

125932

7

881524

8

7052192

To prove t
, or, &c.
whole g

Example 1.

Three Merchants made a Stock as follows, viz.

$$\begin{array}{l} A. \\ B. \\ C. \end{array} \left. \begin{array}{l} \text{put in} \\ \end{array} \right\} \begin{array}{l} 560 \\ 391 \\ 256 \end{array} \begin{array}{l} \text{And by Trading they gain'd} \\ \text{or lost } 152 \text{ l. what is each of} \\ \text{their shares?} \end{array}$$

the whole Stock 1207 gain 152, what 1?

1207) 152.000000 (.125932 or

2 s. 6 d. and

.3130 near 1/2 gain'd
or lost per l.

.7160

11250

.3870

.2490

.125932

$$\begin{array}{r} 7 \\ 881524 \\ 8 \end{array} \left. \begin{array}{l} \text{l.} \\ \end{array} \right\} 560$$

70.521920

.125932

391 l.

1133388

377796

B's l. 49.239412

.125932

256 l.

755592

629660

251864

C's l. 32.238592

To prove this Rule, add the particular shares of the
A, or, &c. into one Sum, and if it be equal to
whole gain, or, &c. the work is right.

Proof

Proof of the last Question :

		l.	s.	d.	f.
A's	Gain	70	10	5	1
B's	or	49	4	9	2
C's	Loss	32	4	9	1

152 : — : — : — Equal to the whole
Gain or Loss.

Example 2.

A Merchant owed to three Persons 460 l. viz.

To { A. } 96 { They employed a Lawyer to get the
 { B. } 105 { Money, and the Charges came to 34
 { C. } 259 { how much ought each to pay towards
 them?

If 460 pay 34 Charges, what 1?

460 | 0) 34.00000 (.073913 or 1 : 5 : 3 very near

and is what the Lawyer
to have per l.

180

420

60

140

.073913

12

886956

8 } l. 96

A pays l. 7.095648

.073913

105 l.

369565

B pays l. 7.760865

A's Share

Single Fellowship.

269

.073913	A. } pays { 7.095648
259 l.	B. } 7.760865
	C. } 19.143467
665217	Proof 33.999980
369565	
147826	

C pays l. 19.143467 very near equal to the whole Charges.

Example 3.

Suppose a Person owes unto 4 Men these following Sums of Money, viz.

	l.	s.	
To {	A. 30		His Estate is found to be but 127 l. 16 s. 6 d. what must each have of the same, and what will it be per Pound?
	B. 64 : 10		
	C. 179		
	D. 87 : 10		

The whole Debt 361 : —
l. l. l.

If 361 — 127.825 — 1
361) 127.825000 (.354085 or 7 s. 1 d. what each must have per l.

19 52

1 475

. 3100

2120

.354085 l. .354085
30 l. 64.5 reversed is 5.46

A's Share l. 10.622550

21 24 51
141 63
1770

B's l. 22.8384

l. 35 4 085
179 reversed is .971
24 7 860
3 1 867

C's l. 63.3 812

$87.5 \text{ reversed is } 5.78$
 283268
 24786
 1770

$D's\ l. 30.9824$

		<i>l.</i>	<i>s.</i>	<i>d.</i>	<i>f.</i>	
<i>A's</i>	} Share {	10	12	5	2	} near
<i>B's</i>		22	16	9	1	
<i>C's</i>		63	7	7	2	
<i>D's</i>		30	19	7	3	

Proof 127 : 16 : 6 : — equal to the whole
[Estate.

Example 4.

Suppose four Men spend 20 s. of which

$$\begin{array}{l}
 A. \left\{ \begin{array}{l} \frac{1}{3} \\ \frac{1}{4} \end{array} \right\} \text{ would pay } \left\{ \begin{array}{l} \frac{1}{5} \\ \frac{1}{6} \end{array} \right\} \text{ which is } \left\{ \begin{array}{l} 6 : 8 \\ 5 - \\ 4 : - \\ 3 : 4 \end{array} \right. \text{ what must} \\
 B. \left\{ \begin{array}{l} \frac{1}{3} \\ \frac{1}{4} \end{array} \right\} \\
 C. \left\{ \begin{array}{l} \frac{1}{3} \\ \frac{1}{4} \end{array} \right\} \\
 D. \left\{ \begin{array}{l} \frac{1}{3} \\ \frac{1}{4} \end{array} \right\}
 \end{array}$$

$\begin{array}{ccc} s. & l. & s. \\ \text{If } 19 & \text{---} 1 & \text{---} 20 \\ & 20 \text{ s.} & \end{array}$

s. 19 :— to pay 20 s.
(with.

19) 20.0000
 (1.0526 or 1 : 1 : — : 2 what
 each is to pay per 4

$$\begin{array}{r} 100 \\ - 50 \\ \hline 120 \end{array}$$

$$\begin{array}{r} s. \quad d. \quad l. \\ 6 : 8 \mid 3 \quad 1.0526 \\ \hline \end{array}$$

A's part .3508

$$\begin{array}{r} s. \quad l. \\ 5 \mid 4 \quad 1.0526 \\ \hline \end{array}$$

B's part .2631

$$\begin{array}{r} s. \quad l. \\ 4 \mid 5 \quad 1.0526 \\ \hline \end{array}$$

C's part .2105

$$\begin{array}{r} s. \quad d. \quad l. \\ 3 : 4 \mid 6 \quad 1.0526 \\ \hline \end{array}$$

D's part .1754

$$\left. \begin{array}{l} A's \\ B's \\ C's \\ D's \end{array} \right\} \text{ part is } \left\{ \begin{array}{l} .3508 \\ .2631 \\ .2105 \\ .1754 \end{array} \right.$$

Proof .9998 very near one l.

l. s.

A and *B* made a Stock, *A* put in 450 : 10, *B* put in a Sum unknown: they gain'd 987 l. 12 s. of which *B* had 479 l. 12 s. for his Share: what is the Share of *A* and Stock of *B*?

	<i>A</i> 's Share.	<i>A</i> 's Stock.	<i>B</i> 's Share.
l. s.	l. 508	— l. 450.5	— l. 479.6
987 : 12 Gain.			450.5
479 : 12 <i>B</i> 's Share.			<u>23980</u>
			23980
508 : — <i>A</i> 's Share.			<u>19184</u>
			508) 216059.8000 (425.3145
	l. s. d. f.		
<i>Ans.</i> { <i>A</i> 's Share 508		1285	
{ <i>B</i> 's Stock 425 : 6 : 3 : 2		<u>2699</u>	
		1598	
		<u>.740</u>	
		2320	
		<u>2880</u>	

CASE

A's Stock

CASE 2.

Double Fellowship

IS when any Man's particular Stock continues an unequal Time in Company, and the Time as well as the Stock is considered.

R U L E.

First Multiply every Man's Stock by the Time of its continuance in Company ; then proceed with those Products, as you did with the Stocks in *Single Fellowship*.

Example 1.

A and B join in Partnership, viz.

$$\begin{array}{l} A \\ B \end{array} \left. \begin{array}{l} \text{put in } \{ \begin{array}{l} 65 \\ 155 \end{array} \} \text{ for } \{ \begin{array}{l} 3 \\ 7 \end{array} \} \text{ Months} \end{array} \right| \begin{array}{l} \text{And by Trading} \\ \text{they gain'd or lost} \\ 85 \text{ l. what is each} \\ \text{Man's Share?} \end{array}$$

$$\begin{array}{r} \text{l.} \\ 65 \\ \underline{\quad} \\ 3 \text{ Months} \end{array} \qquad \begin{array}{r} \text{l.} \\ 155 \\ \underline{\quad} \\ 7 \text{ Months} \end{array}$$

$$\begin{array}{r} A's \text{ stock \& time } 195 \\ B's 1085 \end{array} \left. \begin{array}{l} \\ \end{array} \right\} \text{ added } \qquad \begin{array}{r} 1085 \\ \underline{\quad} \\ 1280 \end{array}$$

If 1280 $\frac{l.}{85}$ $\frac{l.}{1}$

128|0) 85.00000 (.066406

820

520

800

.066406

+95 A's S. & T.

332030

597654

.066406

+103 B's S. & T.

332030

531248

l. 12.949170 A's Share. l. 72.050510 B's Share:
72.05051 B's

Proof l. 84.99968 near equal to the whole gain or loss.

Observe, when any Partner's Stock varies by putting in more Money or taking out, you must consider how long each part of the varying Stocks continued in Company, and multiply them by their respective Times, as follows.

Example 2.

Three Merchants made a Joint Stock for 12 Months: A put in 120 l. and at the end of 4 Months he put in 86 l. more; B put in 368 l. and at the end of 6 Months took out 108 l. C put in 121 l. and 7 Months after 86 l. more, and 2 Months after that 130 l. more

more;
each M

A's Sto

A's 21
B's 37
C's 22

81

Double Fellowship.

275

more ; and they gain'd by Trading 416 l. what is each Man's Share?

l.	l.	l.	l.
120	86	368	108
12 M.	8 M.	12 M.	6 M.
1440	688	4416	648
688		Sub. 648	
2128		3768	

A's Stock and Time.

B's Stock and Time.

l.	l.	l.
121	86	130
12 M.	5 M.	3 M.
1452	430	390
430		
390		

2272 C's Stock and Time.

A's 2128
B's 3768
C's 2272 } Stock and Time.

l.	l.
8168	416
8168	416.0000000000 (.05093046
.76000	
24880	
37600	
49280	

Double Fellowship.

2128 reversed is $\frac{.05093046}{.8212}$ 3768 reversed is $\frac{.05093046}{.8673}$

1018609

50930

10186

4074

A's gain $\text{£ } 108.3799$

1527914

356513

30558

4074

B's $\text{£ } 191.9059$

2272 reversed is $\frac{.05093046}{.2722}$

1018609

101861

35651

1019

C's $\text{£ } 115.7140$

£
A's Gain 108.3799
B's 191.9059
C's 115.7140

Proof 415.9998

Near equal to the
(gain.

Example 3.

Two Merchants A and B enter into Company :
A puts in 800 £ . and at the end of five Months he
takes out a Sum, and leaves the rest to continue nine
Months longer : B puts in 340 £ . and at 3 Months
end he put in 550 £ . more, and then his whole Sum
continues 8 Months longer ; at the ballancing of their
Accompts, A finds he has gained 210 £ . and B
gained

Double Fellowship.

277

gained 250 l. the Question is, how much A took out of the Stock?

A.	B.	
l.	l.	l.
800	340	550
5 M.	11 M.	8 M.
4000	3740	4400
	4400	

3140 B's Stock and Time.

B's gain. B's S. and T. A's gain.
 f 25|0 l. — 8140 — 210
~~210~~ A's gain.
 1628

5) 170940|0

5) 34188

6837.6 A's whole stock and time.

Subtract 4000 - Product of A's stock which continued five Months.

Months 9) 2837.6 the Product by 9 Months of the stock which A left.

315.28888 the stock which A left at

5 Months end being subtracted from 800 l. which A first

315.2888

put in, leaves ———— l. 484.7112 the Sum which A took out.

Loss

Loss and Gain.

• **B**Y a proper application of the former Rules Questions of Loss and Gain, we discover what is got or lost per Cent, in buying or selling Goods or how to raise or fall the price in order to gain or lose so much per Cent, or per bargain, &c.

Example 1.

Bought 234 Yards of Check at 16 d. per Yard and sold it at 18 d. 3 f. per Yard, what did I gain per Cent?

d.	d.	f.	ss.
If 16 gain 2 : 3, — what 1000?			
		3	
8-pences	2	.011458	
		3000	
	2)	34.374000	

Answer l. 17.187

Or 17 l. 3 s. 8 d. 3 f.

Observe, before I can tell what I can buy or sell any thing for per Yard, lb. &c. I must know what I can buy or sell the whole for.

Example

Example 2.

Bought a Pipe of Wine for 14 l. 7 s. and it chanced to leak out 15 Gallons, what must I sell the remainder for per Gallon, so as to lose nothing per bargain?

	gal.	l.	s.	gal.
Pipe				
1	If 111	14	7	1
2	111)	14.3500	(.1292	Ans.
			or	
2 Hd:		3 25	2 s. 7 d.	
63				
		1030		
26 gal.				
15 gal. Subtracted.		.310		
11 gal.				

Example 3.

Bought 271 Yards of Cloth for 19 : 18, what must I sell it for per Yard to gain 3 l. per bargain?

l.	s.	Yd.	l.	s.	Yd.
19	18	Bt. for.	If 271	be sold for	22 : 18, what 1?
3	—	Gained.	271)	22.9000	(.0845
				or	
2	18	fold for.		1 210	1 s. 8 d. 1 f.
				1360	

Example

Loss and Gain.**Example 4.**

Bought 171 Ells of Holland for 50 Guineas, but
some Damage having happened, I am willing to lose
5% per bargain, what must I sell it for per Yard?

50 Guineas are 50 and 50
2 : 10

Bought for 52 : 10
Lost 5

Sold for 47 : 10

Ells l. Yd.
If 171 be sold for 47.5, what 1?

.8 .8 Decimal of a Yd.
Ell being the Unit
171) 38.0 000 (.2222 Answer.

or
.380 4 s. 5 d. 1 f.

380

380

Example 5.

If I give 14 s. 6 d. per Yard for Broad Cloth,
how must I sell it per Yard to gain 17% per Cent?

If 100 l. gain 17 l. what 14 s. 6 d.?

.725
17 l.

100) .12.325
or

added { 2 s. 5 d. 2 f. gain'd
 { 14 : 6 Bought for } per Yd.

5. 16 : 11 : 2 Sold for

Or

Or thus,

l. l. s. d.
If 100 become 117, what 14 : 6 ?

$$\begin{array}{r} .725 \\ +17\text{ l.} \\ 5075 \\ 725 \\ \hline \end{array}$$

1|00) .84.825 Answer.

Or 16 s. 11 d. 2 f.

Example 6.

Bought 24 C. of Gauls for 68 l. 17 s. how must
sell them per C. to gain 12 l. per Cent ?

l. l. l.
If 100 gain 12, what 68.85 ?
12 l.

$$\begin{array}{r} 1|00) 8.26.20 \text{ gain'd in all.} \\ 68.85 \text{ Bought for.} \\ \hline \end{array}$$

C. C.
If 24 be sold for l. 77.1 12, what 1 ?

$$\begin{array}{r} 4) \text{ —————} \\ 6) 19.278 \\ \hline \end{array}$$

3.2 13 Answer.

Or 3 l. 4 s. 3 d.

L 1

Or

Or thus:

C. l. C.
If 24 cost 68.85, what 1?

$$\begin{array}{r} 4) 68.85 \\ \hline 6) 17.2125 \\ \hline \end{array}$$

If £100 become £112, what £286875?

$$\begin{array}{r} 112\text{ l.} \\ 3442500 \\ \hline 100) 32130000 \text{ Answer} \end{array}$$

Or 3 l. 4 s. 3 d.

Example 7.

Bought 36 C. 1 Q. of Sugar at 1 l. 7 s. 9 d. per
and sold it for 4 d. 2 f. per lb. whether did I gain
lose, and how much per bargain?

$$\begin{array}{r} d. \quad lb. \quad d. f. \\ 4 \mid 6) 112 \text{ at } 4:2 \\ f. \mid \hline 2 \mid 8) 18:1:4 \\ 2:-:6 \\ 2 \end{array}$$

2.1:-:- Sold
1.3:1:9 Bought } it for per C.

7:-:3 Gained per C.

C. ss. s. d. C. 2.
If I gain 7 : - : 3, what 36 : 1 ?

d. ss. s. d.
3|8) 36 : - : 6
7 ss.

25 3 : 1 : 6

4 : 1 : - : 3

Answer, gained in all 25.8 : - : 6 : 3

Or you may work thus :

First find what the Sugar cost, then find what you
it for, and the difference will be the gain or loss
bargain.

Example 8.

Bought 369 Stone of Iron for 1500 l. present
ney, and sold it at 3 l. 15 s. 4 d. per Stone, to be
at 9 Months ; whether did I gain or lose, and how
ch per bargain, allowing Discount for the time after
per Cent ?

First find what the Iron was sold for ; then find the
ent worth of that Money for 9 Months, and if
Sum be greater than what you bought it for,
gain ; and the contrary, if it be less.

The

Loss and Gain.

The Operation.

d. l. s. d.

$\left. \begin{array}{l} 8|30 \\ 8|30 \end{array} \right\} 369$ Stone at 3 : 15 : 4

3.7

258.3

M. 1107

3f4) .05 12.3

Sub. .0125 12.3

1.

1500. Bought for

1.0375) 1389.900000000 (1339.6626 sold for

fent Mo

• 352.40

460.3374 lost per

or

. 41 150

160 l. 6 s. 9 d. v

10 0250

68750

. 65000

• 27500

. 67500

neither
forme

If 8
of it n
5 l. f
In
Comm
of the
4)
If 4 F
—
I

If

3.

Bart

Barter.

BARTER is a Rule, by which Merchants, &c. exchange one Commodity for another, so that neither party sustain Loss, and is done by some of the former Rules.

Example 1.

If 8 Yards of Cloth cost 16 s. 6 d. how many Yards of it must be given for 52 Pieces of Fustian at the rate of 5 l. for 4 Pieces?

In such Examples as these, first find the value of one Commodity, and with the said value find how much of the other Commodity is equal to the said value.

4) $\frac{L.}{40}$ 4) 52 Pieces?

$\frac{1}{1}$ $\frac{40}{200}$ $\frac{13}{13}$

200 Six-pences.

13

2600 Six-pences : Value of the Fustian.

$\frac{s.}{16} : \frac{d.}{6}$ buy 8 Yards, what 2600 six-pences?
2 8 Yards

33

3) 20800 Yards

11) 6933 : 1 : 1.33

Answer 630 : 1 : 0.84

Yd. 2. N.

Observe,

Observe, in these Examples let the Answer to the first operation be given in that Denomination, into which you intend to reduce the first number in the second operation; as for instance, in the Example above, the first number in the second operation will be the easiest reduced into Six-pences; therefore I give the Answer to the first operation in Six-pences.

Example 2.

How many Yards of Tabby at 6 s. per Yard, must be given for 89 Yards of Broad Cloth, at 15 s. 4 d. per Yard?

$$\begin{array}{r}
 \begin{array}{r}
 \text{Yd.} \quad \text{s.} \quad \text{d.} \quad \text{d.} \\
 1 \text{ --- } 15 : 4, \text{ --- } 89? \\
 \quad \quad \quad + 5 \text{ s.} \\
 \quad \quad \quad 445 \\
 \quad \quad \quad 29.6666
 \end{array} \\
 \begin{array}{r}
 \text{s.} \quad \text{Yd.} \\
 6 \text{ --- } 1 \text{ --- } \text{s.} \quad 1364.6666 \\
 \quad \quad \quad \text{s.} 6) \text{ --- } \\
 \quad \quad \quad \text{Yd.} 227.4444 \\
 \quad \quad \quad \quad \quad 16 \text{ N.} \\
 \quad \quad \quad \quad \quad \text{N.} 7.1104
 \end{array}
 \end{array}$$

Answer Yd. N.
227 : 7

Example

Example 3.

A hath 2 Packs of Cotton Wooll weighing 240 *lb.* each, at 15 *d.* per *lb.* which he gives B for Broad Beds at 5 *s.* per Yard, how many Yards must B give A for his Cotton Wooll?

<i>lb.</i>	<i>d.</i>	<i>lb.</i>
1	15	2 Packs each 240
1		2
Fifteen-pence.		480 <i>lb.</i> or
		Fifteen pences.

<i>s.</i>	<i>Yd.</i>	
5	1	480 Fifteen-pences
4	4)	120 <i>Yd.</i> Answer.
Fifteen-pences 4		

Example 4.

A has 52 Dozen of Hats (or 624) at 2 *s.* 6 *d.* per Hat. B has Cotton at 10 *d.* per *lb.* how much Cotton must B give A for his Hats?

<i>Hat.</i>	<i>s.</i>	<i>d.</i>	<i>Hats.</i>
1	2	6	624
Ten-pences-	3		3 Ten-pences.

1 Ten-pence. 1 *lb.* — 1872 Ten-pences, or the Answer in *lb.* the multiplier and divisor being but one.

Example

Example 5.

A gives to B 472 Yards of Canvas at 16 d. per Yard for 38 Pieces of Cloth, how much is 1 Piece of Cloth valued at?

Yd.	d.	Yd.
1	16	472
	—	2

8-pences 2

3 | 0 | 94 | 4 Eight-pences:

Ps.	—	Ps.
38	l. 31.46665	—

Value of the Canvas.

38) 31.46666 (.82807 Answer.

or 16 s. 6 d. 3 f. near

1 06

3 06

.266

Example 6.

A and B Barter; A hath 86 Gallons of Brandy worth 9 s. 2 d. per Gallon ready Money, but in Barter he will have 11 s. per Gallon; B hath Serge worth 2 s. 1 d. per Yard ready Money, but in Barter he raises his price proportionably to A's: How many Yards of Serge must B give A for his Brandy?

The common way of working Questions of this nature is, first to find what advance B ought to make per Yard for his Serge, in proportion to what A hath done upon a Gallon of his Brandy; but when the Barter prices are raised proportionably, we can find the Quantity without taking notice of the Barter prices; therefore there is no occasion to find B's advanced price in order to find the Quantity, as most Authors imagine.

The

The operation of the foregoing Example.

Gal.	s. d.	Gal.
1	9 : 2	86
	12	110 d.
	—	86
	110 d.	—
2 s. 1 d.	— 1 Yd.	9460 d.
12		5) —
—		5) 1892
25 d.		—

Answer 378 : 1 : 2 $\frac{2}{5}$
Yd. 2. N.

Example 7.

A and B barter, B has 1375 Yards of Shalloon 19 d. per Yard for which A gives him Broad cloth at 17 s. 4 d. per Yard, and a Bill of 50 l. 6 Months hence, how many Yards must A give besides the Bill?

First find what B's Shalloon comes to; then find what A's Bill is worth in ready Money, which Subtract from the Value of B's Shalloon, and for what M m remains,

290

Barter.

remains, see how many Yards A must give B at 17 s. 4 d. per Yard?

d. Yd d.
 20 | 12) 1375 at 19 d.
 1 | 20) 114.58333 at 20
 Subtract 5.72916 at 1

108.85417 Price of the Shalloon;
 Subtract 48.7804 the Bill discounted.

l. 60.07377 the value A must give B in Cloth
 M. at 17 s. 4 d. per Yard.

6 | 2) .05
 l. l.
 1.025) 50.000000 (48.7804 The Bill
 (discounted)

.9000
 .8000
 .8250
 ..5000

s. d. Yd. l.
 17 : 4 — 1 — 60.07377
 3 60 Groats.

Groats 52
 52) 3604.42620 (69.3158
 16 N.
 .484
 .164
 .82
 306
 .462
 5.0528
 Yd. N.
 69 : 5 Answer
 Exchange

0000

Ex

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Exchange of Coins.

EXCHANGE is the *Bartering* or *Exchanging* Money in one Country or Nation, for the value bid in another, by means of an Instrument in Writing, called a *Bill of Exchange*.

The *Par of Exchange* signifies the equality of the intrinsic value of the real species of any Country with that of another, as 33. Shillings and 4 Pence Flemish equal to 20 Shillings sterling or English Coin; but the course or Current running price differs very often; that is, it rises and falls according as Money is plenty or scarce, or according to the time allowed for payment of the Money in Exchange, &c. therefore sometimes a Pound sterling is Exchanged for less than the Par, or 33 Shillings and 4 Pence, then we lose by the change; and sometimes above the Par, then we gain.

All Questions in Exchange may be performed by the *Golden Rule*, and are to be stated thus, *viz.*

The Coin which is to be Exchanged must be in the first place, and that Money which is the rate of Exchange in the same Country Money in the first place, the rate which is of the same Country Money in the second place. The Answer is to be of in the second place.

It would be too tedious to give instances of every kind of Exchange; therefore I shall only give a few examples of the Exchanges of England with some of the chief Countries of Europe.

England

England with Holland, Flanders, and German

In Holland, &c. they keep their Accompts
Guelders, Stivers, and Pennicks, or in Pounds, Shilling
and Pence, Flemish; and Exchange with us upon one
Pound, giving us for it, when at Par, 33 s. 4 d. Flemish

Note, Their Pounds, Shillings, and Pence, are divided as ours; but their other Money is thus divided viz.

pence.

16 Pennicks 6 } 20 } Stivers 6 Guilders	make 1	{ Stiver or 2 { Shilling { Guilder { Pound Flemish	} Fle.	{ in English { Money is	{
--	--------	---	--------	----------------------------	---

Observe, 5 Stivers is our Six-pence.

Example 1.

If a Merchant pays in London 389 £. 16 s. 6
Sterling, what Flemish Money must he draw his Bill
for, to Amsterdam, Exchange at 33 s. 4 d. Flemish
for our Pound Sterling?

[illegible]

Four-pences 100

Answer 649l. 14s. 2d. Flemish

Here the prop is set two figures nearer the right hand
instead of multiplying by 100; the Product therefore
is Four-pences, which divide by 60 gives 1, Flemish

Exam

Example 2.

Change 179 l. 15 s. 6 d. Sterling into Flemish Money, Exchange at 34 s. 6 d. Flemish per l. Sterling:

$$\begin{array}{r}
 \begin{array}{cccc}
 l. & s. & d. & l. \\
 \hline
 \text{If } 1 & \text{---} 34 : 6 & \text{---} & 179.775 \\
 & 2 & & 69 \text{ Six-pences} \\
 & \text{---} & & \text{---} \\
 \text{Six-pences } 69 & & & 1617 \ 975 \\
 & & & 10786 \ 50 \\
 & & & \text{---} \\
 & & & 4 | 0 \ 12404 \ 475 \text{ Six-pences} \\
 & & & \text{---}
 \end{array}
 \end{array}$$

Answer l. 310.1118 Flemish.

Or 310 l. 2 s. 2 d. 3 f.

Or thus,

$$\begin{array}{r}
 \begin{array}{cccc}
 l. & s. & d. & d. \\
 \hline
 1 & \text{---} 34 : 6 & \text{---} & 6 | 40 \ l. \\
 & & & 179.775 \\
 & & & \text{---} \\
 & & & 125.842 \ 5 \\
 & & & 4.494 \ 3 \\
 & & & \text{---}
 \end{array}
 \end{array}$$

Answer l. 310.1118 as before.

If you would have the Answer in Guilders, Stivers, &c. Multiply the Flemish Pounds and Shillings by 6 (because 6 Guilders make a Pound Flemish, and 6 Stivers make a Shilling Flemish) and the Product will be Guilders and Stivers: and observe, if there be any Flemish Pence, that every 2 d. makes one Stiver more to be added, and for 1 d. add 8 Pennicks, &c.

The

The foregoing Flemish Money brought into Guilders and Stivers.

$$\begin{array}{r} \text{l.} \quad \text{s.} \quad \text{d.} \quad \text{f.} \\ 310 : 2 : 2 : 3 \\ 6 \end{array}$$

1860 : 12 } *Answer,* | Here for the odd
1 : 6 } 2 d. 3 f. I reckon
Guild. Stiv. Pen. 1 Stiver and 6 Pennicks.

Example 3.

Change 679 *l.* 14 *s.* Sterling into Flemish Money,
Exchange at 33 *s.* 7 *d.* Flemish per *l.* Sterling.

$$\begin{array}{r} \text{l.} \quad \text{s.} \quad \text{d.} \quad \text{l.} \\ \text{If } 1 \text{ — } 33 : 7 \text{ — } 679 \text{ } 7 \\ \quad \quad \quad 12 \quad \quad \quad 403 \text{ } d. \end{array}$$

$$\begin{array}{r} 403 \text{ } d. \quad 2039 \text{ } 1 \\ \quad \quad \quad 27188 \end{array}$$

$$12) d. 273919.1$$

$$250) s. 22826.59$$

Answer l. 1141.3 295

Or 1141 *l.* 6 *s.* 7 *d.*

$$\begin{array}{r} \text{s.} \quad \text{d.} \quad \text{Or thus,} \\ 10 \quad \quad \quad 2 \quad \quad \quad \text{l.} \quad \text{s.} \quad \text{d.} \\ 3 : 4 \quad \quad \quad 6 \quad \quad \quad 679 \text{ } 7 \text{ at } 33 : 7 \\ 3 \quad \quad \quad 80 \quad \quad \quad 339.85 \\ \quad \quad \quad \quad \quad \quad 113.2833 \\ \quad \quad \quad \quad \quad \quad 8.4962 \end{array}$$

Answer l. 1141.3295

Here the top line is added in for 1 *l.*

The

The
Guilders

Or,
Stivers,
Bring
be reduc
1 Stiver,
you bring

How
of 679 *l.*
per *l.* St
l.
If 1 —

In 1 Gui

valued by
fully.

The foregoing Flemish Money brought into Guilders, &c.

$$\begin{array}{r} \text{l.} \quad \text{s.} \quad \text{d.} \\ 1141 : 6 : 7 \\ \hline 6 \end{array}$$

$$\begin{array}{r} 6847 : 16 \\ \hline 3 : 8 \end{array} \left. \vphantom{\begin{array}{r} 6847 : 16 \\ \hline 3 : 8 \end{array}} \right\} \text{Answer.}$$

Guild. Stiv. Pen.

Or, Sterling Money may be brought into Guilders, Stivers, &c. thus,

Bring it into such Flemish Money, as may the easiest be reduced in Guilders, &c. for as 2 d. Flemish makes 1 Stiver, and 20 Stivers make 1 Guilder, therefore if

you bring it into $\left\{ \begin{array}{l} \text{Two-pences} \\ \text{Four-pences} \\ \text{Pence} \\ \text{Half-pence} \end{array} \right\}$ and divide by $\left\{ \begin{array}{l} 20 \\ 10 \\ 40 \\ 80 \end{array} \right\}$ it gives Guilders, &c.

Example 4.

How many Guilders at Rotterdam will pay a Bill of 679 l. 14 s. Sterling, Exchange at 35 s. 6 d. Flemish per l. Sterling?

$$\begin{array}{r} \text{l.} \quad \text{s.} \quad \text{d.} \quad \text{l.} \\ \text{If } 1 \text{ --- } 35 : 6 \text{ --- } 679.7 \\ \hline 6 \end{array}$$

213 Stivers.

203 91

213 dd. or Stivers. 13594

In 1 Guild. are Stiv. 20 Stiv. 14477 | 6.1 This being the Decimal

Answer 7238 : 16 : 1.6 part of a G. S. P. Stiver, when

valued by multiplying by 16, gives 1 Pennick and a half fully.

Example

Exchange.

Example 5.

Change 143 l. 9 s. 6 d. Sterling into Guilders, &c.
Exchange at 33 s. 8 d. Flemish per l. Sterling.

$$\begin{array}{r}
 \text{l.} \qquad \qquad \text{s.} \quad \text{d.} \qquad \qquad \text{l.} \\
 \text{If } 1 \text{ --- } 33 : 8 \text{ --- } 143.475 \\
 \qquad \qquad \qquad 3 \qquad \qquad \qquad \text{---} 101 \text{ 4-pences} \\
 \qquad \qquad \qquad \qquad \qquad \qquad \qquad \qquad \qquad \text{143475}
 \end{array}$$

Four-pences 101

4-pences in 1 Guilder are 1 10) 1449.0.975

Answer 1449 Guilders, and .0975 Parts of a Guilder which valued by multiplying by 20 and 16 is 1 Stiver, 15 Pennicks.

Example 6.

What number of Guilders, &c. may I draw my Bill for to *Antwerp*, if I pay in *London* 234 l. 13 s. Sterling, Exchange at 33 s. 7 d. 1 f. Flemish per l. Sterling?

$$\begin{array}{r}
 \text{l.} \qquad \qquad \text{s.} \quad \text{d.} \quad \text{f.} \quad \text{1[4] l.} \\
 \text{If } 1 \text{ --- } 33 : 7 : 1 \text{ --- } 234.65 \\
 \qquad \qquad \qquad 12 \qquad \qquad \qquad \text{---} 403 \text{ d.} \\
 \qquad \qquad \qquad \text{---} \qquad \qquad \qquad \text{---}
 \end{array}$$

403 d.

70 3.95
93860.
5 8.6625

d.

In 1 Guilder are 4 10) d. 9462 | 2.6125

Answer 2365 G. and 22 d. rem. or 11 Stivers and .6125 parts of a Penny which valued will be 2 f. or 4 Pennicks.

Observe, in the last Example, though there be a Farthing in the second number, I only bring the second number into Pence; then multiply with them, and for the Farthing I take a 4th, &c.

Example

Example 7.

Change 314 : 16 Sterling into Guilders, &c. Exchange at 33 s. 4 d. Flemish per l. Sterling.

Observe, in this Question as the Exchange is at Par, viz. 33 s. 4 d. you easily reduce Sterling Money into Guilders, for as our 2 s. is equal to 1 Guilder, therefore as many Two-shillings's reckon so many Guilders, and if there be any odd Money for 6 d. reckon 5 Stivers, &c. And the contrary for reducing Guilders, &c. into Sterling Money.

The Answer to the last Example is 3148 Guilders, there being so many ss. in 314 l. 16 s.

Example 8.

What Sterling Money are there in 6141 Guilders, 10 Stivers, Exchange at 33 s. 4 d. per l. Sterling?

6141 Guilders or Two-shillings's are 614 : 2 } Answ.
10 Stivers are _____ 1 }

Example 9.

Change 384 : 16 Flemish into Sterling Money, Exchange at 32 s. 8 d. Flemish per l. Sterling.

ss. s. d. l. ss.
If 16 : — : 8 — 1 — 3848
3 3 Eight-pences:

49 Eight-pences. 7) 11544

7) 1649.1428

Answer 235.5918

Or 235 l. 11s. 10d.

N n

Example

Example 10.

Change 4171 Guilders, 17 Stivers into Sterling Money, Exchange at 32s. 7d. 2f. per l. Sterling

s. d. f. l. Guild. Stivers.

If 32 : 7 : 2 — 1 — 4171 : 17

12 0 1 10 11 20

391 d.

83437 Stivers or dd.

2

4 half-pence.

half-pence 783

783) 333748.0000 (426.242

or Answer

2054 426l. 4s. 10d. 1

very near

4838

1900

3340

2080

5140

In France
and Denie
Paris 4 s.

12 Den
20 Sols
3 Livr

Exam

Example 11.

Antwerp draws upon *London* for the Value of 347 Guilders, 12 Stivers, the Exchange at 32 s. 10 d. Flemish per 1, Sterling, what must be paid at *London*?

s.	d.	l.		Guild. Stivers.
32	10	—	1 Sterling	347 : 12
6			Stivers in 1 S. F.	20 Stivers or dd.

197 Stivers or dd, 197) fliv. 6952.0000 (35.2893

or Answ.
1042 35l. 5s. 9d. 1f.

.570

1760

.1840

.670

F R A N C E.

In *France* they keep their Accompts in Livres, Sols, and Deniers; and Exchange upon the Crown, whose Par is 4 s. 6 d. Sterling Money.

12 Deniers	} make 1	{ Sol or Sou	} in English	{	d. f.	
20 Sols					{ Livre	1 : 6 s
3 Livres					{ Crown	4 : 6

Example

• *Exchange.**Example 1.*

What Sterling Money must be paid in *London* to receive in *Lyons* 325 Crowns, Exchange at 4 s. 4 d. per Crown?

Crown. s. d. Crowns.

1 — 4 : 4 — 325 s. d.

Groats 13 in 4 : 4

6) 4225 Groats.

Answer 70.4 : — : 4

Or thus,

d. s. d.

4) 325 at 4 : 4

325 —

54 : — : 4

Answer 70.4 : — : 4

Example 2.

Suppose a Bill drawn by a Merchant in *London* on another at *Paris*, for 700 l. Sterling, at 57 d. per Crown, how many French Crowns must be paid for the Bill?

d. Crown. l.

57 — 1 — 700

20

14000 s.

12

d. — Crowns.

57) 168000 (2947

540

270

Crowns. Sols. 6

420

Answ. 2947 — 22 57

21 Crowns.

60 Sols.

Sols.

57) 1260 Sols. (22

120

Example

Exchange.

Example 3.

What must I draw my Bill for to *London*, if I pay
in *Reven* 1416 Crowns 18 Sols 6 Deniers, Exchange
at 54 d. 1 f. per Crown?

C.	d.	f.	Crowns.	Sols.	Den.
—	54	:	1	—	1416 18 6
	d.				
	3	80 }	1416.3083		
	3	80 }		.2	
			283.26166		
	f.		17.70385		
	1 12)		17.70385		
			1.47532		
			320.14468		Answer.

Or 320 : 2 : 10 : 2
l. s. d. f.

I T A L Y.

In *Italy* they also keep their Accompts in *Livres*,
Sols, and Deniers, and Exchange upon the Piece of
Eight, or Dollar; whose Par is Sterling 4 s. 6 d.

Note, at { *Genoa*, 5 } *Livres* make a Piece of $\frac{8}{3}$
 { *Leghorn*, 6 }

Example

E X A M P L E.

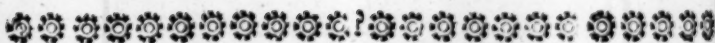
What must be received at *London*, if I pay at *Leghorn*,
 1640 Livres 14 Sols, Exchange at 55 d. 1 f.

$$\begin{array}{r}
 \text{Liv.} \quad \text{s.} \quad \text{d.} \quad \text{f.} \\
 6 \text{ --- } 4 : 7 : 1 \text{ --- } \text{Liv. } 1640.7
 \end{array}$$

$$\begin{array}{r}
 \text{f.} \\
 1 | 12) \quad 20.5087 \\
 \hline
 1.709
 \end{array}$$

Livres 6) 377.7027

Answer l. 62.9504



S P A I N.

In *Spain* they keep their Accompts in Rials and
 Mervadies, and Exchange upon the Piece of Eight,
 the Par of which is 4 s. 6 d. Sterling.

$$\begin{array}{l}
 \text{Note,} \\
 372 \text{ Mer. } \left. \begin{array}{l} \text{8 Rials} \end{array} \right\} \text{ make } 1 \left\{ \begin{array}{l} \text{Rial} \\ \text{Piece of} \end{array} \right. \left. \begin{array}{l} 8 \text{ in English} \\ 8 \text{ Money is} \end{array} \right\} \begin{array}{l} \text{s. d. f.} \\ 6:3 \\ 4:6 \end{array}
 \end{array}$$

Example

Exchange.

303

Example 1.

If I pay at London 125 l. 16 s. how many Pieces of $\frac{8}{3}$ at 53 d. Sterling?

d. Ps. $\frac{8}{3}$ ss.

53 — 1 — 1258

2

2516 s.

12 d.

53) 30192 (569 Ps. $\frac{8}{3}$

369

512

35 Ps. $\frac{8}{3}$

8 Rials.

53) 280 R. (5 R.

15 R.

372 Mervadies.

53) 5580 (105 Mer.

.280

15

Example

Ps. $\frac{8}{3}$ Rials Mer. $\frac{15}{53}$
Answer 569 : 5 : 105 $\frac{15}{53}$

Example 2.

How many Pounds must I receive in *London*, if I pay at *Madrid* 1000 Pieces of $\frac{8}{9}$ at 54 *d.* 3*f.* Sterling?

Or thus,

$s. \quad d. \quad f.$
 1000 at 4 : 6 : 3
 1000

f.
3000

6750 d,

0562 s. 6 d.

Answer 228.1 ss. — s. 6 d.

s. d. f.
Decimal of 4 : 6 : 3
.228.125 Here I multiply
by 1000 by set-
ting the prop 3
places nearer the
right hand, so the
Answer is 228 l.
2 s. 6 d.

PORTUGAL.

In *Portugal* Accompts are kept in Rees, and Exchange upon the Mill-See, the Par of which is about a Noble or 6 s. 8 d. Sterling.

Note, 1000 Rees make 1 Mill-Ree, from Mills which signifies a Thousand.

Example

Example 1.

How many Rees must a Bill be drawn for to pay 160 l. 16 s. Sterling, the Exchange at 6 s. 7 d. per Mill-Ree?

$$\begin{array}{rcl} s. & d. & \text{Rees.} \\ 6 & : & 7 \\ \hline 12 & & 2 \end{array}$$

79 d.

3216 s.
12

Rees.
79)38592000* (488506 Answer

699

672

400

.500

* Three Cyphers fixed instead of multiplying by 1000.

Example 2.

How many Pounds Sterling must a Bill be drawn for to answer 500 Mill-Rees and 550 Rees at 5 s. 7 d. per Mill-Ree?

$$\begin{array}{rcl} s. & \text{M.R.} & s. \quad d. \\ 5 & | & 4)500.550 \text{ at } 5 : 7 \\ d. & | & \\ 6 & | & 10)125.1375 \\ 1 & | & 6)12.5137 \\ & & 2.0856 \end{array}$$

Answerl. 139.7368

Or 139 l. 14 s. 8 d. 3 f.
O O

An



A N

A P P E N D I X,

*Containing divers easy Contractions in several
parts of ARITHMETICK.*

TO multiply with a Multiplier composed of some three numbers in the Multiplication Table, which numbers may be found thus;

R U L E.

Divide the Multiplier by any number so as to have no Remainder; and if the Quotient be the Product of any two numbers in the Multiplication Table, those two numbers and that which is your Divisor, are the three numbers which you are to multiply by: for instance, suppose the Multiplier be 216, I divide it by 3, and the Quotient is 72, which is the Product of 9 times 8; therefore 3, 9, and 8 are the Multipliers.

Example

Pro

Obser
tracting

E X A M P L E S.

l. s. d. f.
Multiply 2 : 17 : 9 : 2 by 216.

ss. s. d. f.
28 : 1 : 9 : 2

3

86 : 1 : 4 : 2

9

780 : — : 4 : 2

8

Answer 624.1 : 1 : — : —

l. s. d. 4)
Multiply 5 : 13 : 9 by 324.

ss. s. d.

56 : 1 : 9

4

227 : 1 : —

9

2047 : 1 : —

9

1842.7 : 1 : —

9

Product 1842.7 : 1 : —

81 is 9 times 9, therefore the multipliers are 4, 9, and 9.

Observe, the same method may be used in Contracting Divisors.

Example

Example, and proof of the last Sum.

l. s.
Divide 1842 : 15 by 324.
ss. s.

$$4) 18427 : 1$$

$$9) 4606 : 1 : 6 \}$$

$$9) 511 : 1 : 9$$

5.6 : 1 : 9 Quotient.

To multiply by 9.

R. U L E.

Begin with the Unit, and Subtract every figure from the figure on its right-hand, supposing a Cypher placed at each end of the Multiplicand.

Example.

Multiply 479 by 9.

Product 4311

The reason of this may be seen by first multiplying by 10 or fixing a Cypher, then Subtracting once the Multiplicand from the Product.

To

To is more t

First two Cyp then, fro the Mu 100, and

Prod. by

Multip gained in Answer. In

Answer

Or, inf ben addin ben the v

Answer

TO multiply whole Numbers, when the multiplier is any Number, not exceeding 12, either less or more than 100.

R U L E.

First multiply by 100, which is done by fixing two Cyphers at the right-hand of the Multiplicand; then, from this Sum subtract or add so many times the Multiplicand, as the Multiplier is above or under 100, and you have the Product.

E X A M P L E S.

Multiply 1643 by 102.

	164300	Product by 100.
	3286	Twice 1643 added; the
		Multiplier being 2 above
Prod. by {	102 is 167586	100; but if Subtracted,
		you have the Product by
	98 is 161014	98.

To reduce C. into lb.

Multiply the C. by 112 (which are the lb. contained in one C.) according to the above Rule for the Answer.

In 41 C. how many lb.

4100 Product by 100.
492 twelve times 41 added.

Answer 4592 lb. Product by 112.

Or, instead of setting down 12 times 41 C. and then adding, you may multiply and add in the mind, when the work will stand thus,

4100

Answer 4592 lb. See Example 2, page 45.

Observe,

Observe, if there be *Q.* and *lb.* in the Example, add the *lb.* contained in both to the Product of the *C.* by 100; then proceed as before, thus;

C. *Q.* *lb.*
In 472 : 1 : 6, how many *lb.*?

47234 here I added 34 to the Prod. of 472 by 100.
5664 twelve times 472 *C.* added, or added as
you multiply thus;

Ans. 52898 *lb.*

47234

Answer 52898 *lb.*

C. *Q.* *lb.*
In 35 : 3 : 20, how many *lb.*?

3604 here I added 104 to the Prod. of 35 by 100.
420 twelve times 35 *C.* added, or added as you
multiply thus;

Ans. 4024 *lb.*

3604

See Example 3, page 47.

4024 *lb.* *Answer*

To value the Decimal parts of a *C.*
Multiply the Decimal by 112, as before.

What is the value of .40178 parts of a *C.*?

40.178 Multiplied by 100 by removing the prop.
4.82136 Twelve times .40178 added, and the
product set two figures nearer
the right-hand, that the prop.
may stand under the prop.

lb. 44.99936 *Answer*

If you multiply and add in the mind, then the
work will stand thus, ——— 40.178

See Example page 205.

lb. 44 99936 as before.

Quotient

Questions in Tare and Tret.

$$\begin{array}{rcl}
 \text{C.} & \text{Q.} & \text{lb.} \\
 \text{Gross } 7 : 1 : 21, & \text{Tare } 13 & \text{per C. how many lb. Net?} \\
 \text{C.} & \text{lb.} & \text{C.} \\
 \text{If } 1 \text{ --- } 99 & \text{Net ---} & 7.43.75 \\
 & & \text{lb. } 7 \text{ } 36.3125 \text{ Answer.}
 \end{array}$$

See Example 1, page 243.

Here the Multiplier being one short of 100, I first multiply by 100 by removing the prop, then I Subtract from the product once 7.4375 for the Answer.

$$\begin{array}{rcl}
 \text{C.} & \text{Q.} & \text{lb.} \\
 \text{Gross } 9 : 1 : 16, & \text{Tare } 24 & \text{per C. how many lb. Net?} \\
 \text{C.} & \text{lb.} & \text{C.} \\
 1 \text{ --- } 88 & \text{Net ---} & 9.39.28 \\
 & & \text{lb. } 8 \text{ } 26.5664 \text{ Answer.}
 \end{array}$$

See Example 4, page 245.

Here the Multiplier being 12 short of 100, I first multiply by 100 by removing the prop, then I multiply by 12 and Subtract.

$$\begin{array}{rcl}
 \text{C.} & \text{Q.} & \text{lb.} \\
 \text{Gross } 25 : 2 : 9, & \text{Tare } 9 & \text{per C. how many lb. Net?} \\
 \text{C.} & \text{lb.} & \text{C.} \\
 1 \text{ --- } 103 & \text{Net ---} & 25.58.03 \\
 & & \text{lb. } 26 \text{ } 34.7709 \text{ Answer.}
 \end{array}$$

Here the Multiplier being 3 above 100, I remove the prop, and then multiply by 3 and add.

To reduce Pounds, or Pounds and an even number of Shillings into Farthings.

First reduce the Money into Two-shillings's, then multiplying them by 96 (which are the Farthings in Two-shillings) according to the Rule in page 309 gives Farthings.

In 47 l. how many Farthings?

471000 Product of the 2-shillings's by 100.
18840 Four times 4710 ss. subtracted leaves
_____ the Product by 96.

Answer 452160 f.

If you Multiply and Subtract in the mind, the work will stand thus, 471000

Answer 452160 f. as before

See Example 8, page 42.

l. s.

In 54 : 16, how many Farthings?

54800 Product of the Two-shillings's by 100.
2192 Four times 548 ss. Subtracted, or
_____ Subtract as you multiply thus,

Answer 52608 f.

54800

Answer 52608 f.

Observe, if there be other Money besides the Two-shillings's, add the Farthings which are contained in it to the Product by 100, and proceed as before.

l. s. d. f.

In 31 : 14 : 7 : 1, how many Farthings?

31729 Here I added 29f. to the Prod. of 317ss. by 100.
1268 Four times 317 ss. Subtracted.

Or thus, 31729
30461 f. Answer.

Answer 30461 f.

To Value the Decimal of a Pound:

FIRST see what Shillings the Decimal will be, as usual; then value the remainder of the Decimal, supposing Two-shillings to be the Unit, which is done by multiplying by 96 as before; and the two places next the left hand in the Product will be Farthings.

What is the Value of .92916 parts of a Pound?

.9|291600

Answer s. 18: f. 27.9936 See Exam. 1, p. 202.

Value .2135

Value .7816

2|13500

.7|31600

Ans. s. 4: f. 12.960

Ans. s. 15: f. 30.336

Observe, in the last Example, there being 8 next the Two-shillings place, 5 of which being reckoned as one Shilling, there remains 3 to be multiplied with the remainder of the Decimal, and the 7 not being multiplied is cut off with a dash.

P p

To

To reduce Farthings into Pounds.

R U L E.

RECKON the figures in the Units and tens places as so many Farthings, and the figures which stand higher, are so many Two-shillings and so many Pence.

Examples.

What is 300 Farthings ? *Answer* 3 ^{ss.} and 3 ^{d.}

f. ss. d.
400 are 4 : 4

f. ss. d.
500 are 5 : 5

f. ss. d.
900 are 9 : 9

f. ss. d.
1000 are 10 : 10

f. ss. s. d.
1500 are 1.5 : 1 : 3

f. ss. d. ss.
2400 are 2.4 and 24 is 1

f. ss. d. f.
614 are { 3 : 2
6 : 6

f. ss. d. f.
747 are { 11 : 3
7 : 7

f. ss. d. ss. ss.
9600 are 96 and 96 is 4 *Answer* 10.0

72 Ounces at 5 f. per oz.

5
—
360 f. are { ss. s. d.
1 : 3
3 : — : 3

See Example 25, page 117.

When

When goods are sold by 5 Score to the Hundred,
or by the Thousand.

First set down the price in Farthings, then
multiply them by the Quantity, and value the Farth-
ings as before.

Yd. d. f.
100 at 2 : 1 per Yard.

f. ss. d.
Product of 9 *f.* by 100 is 900 or 9 : 9 *Ans.*

See Example 3, page 208.

Yd. d. f.
1000 at 1 : 3 per Yard.

f. ss.
Prod. of 7 *f.* by 1000 is 7000 { or ——— 7.0
and 70 *d.* is 2 : 1 : 10

See Example 5, page 208.

When the number of Farthings are large, they
will be easier to reduce by the common method.

To find the value of any number of *C.* when
the price of a lb. is given.

R U L E.

The Farthings which the lb. cost reckon as so
many Two-shillings's, and multiply them and the
together ; then divide this product by 6, and add
the lines together for the *Answer*.

The reason of the above Rule will plainly appear
considering the method of finding the value of
one

one *C*. For in that case, the Farthings being reckoned as Two-shillings's gives the value of 96 *lb*. for if 1 *lb*. cost 1 *f*. certainly 96 *lb*. will cost 96 *f*. or 1 *ss*. therefore as many Farthings, I reckon so many Two-shillings's : now as 96 *lb*. is 16 *lb*. short of 112 *lb*. therefore for 16 *lb*. I take a 6th part of the value of 96 *lb*. because 16 *lb*. is a 6th part of 96 *lb*. then the two lines I add together for the value of 1 *C*. or 112 *lb*. now to find the value of any number of *C*. it seems the most reasonable to multiply the value of 1 *C*. by the number of *C*. but as it is the same to multiply, either before or after I divide; therefore I chuse to multiply before I divide.

Example 1.

What will 1 *C*. come to, at 7 Farthings per *lb*.?

$$\begin{array}{r}
 \text{ss.} \\
 6) 7 \\
 \hline
 1 : - : 4
 \end{array}
 \left. \vphantom{\begin{array}{r} \text{ss.} \\ 6) 7 \\ \hline 1 : - : 4 \end{array}} \right\} \text{Value of } \left\{ \begin{array}{r} \text{lb.} \\ 96 \\ 16 \\ \hline 112
 \end{array} \right.$$

Answer .8 : - : 4

Example 2.

d. *f.* *C.*
At 3 : 1 per *lb*. what will 1 cost ?

$$\begin{array}{r}
 \text{ss.} \\
 6) 13 \\
 \hline
 2 : - : 4
 \end{array}$$

Answer 1.5 : - : 4

Example

Example 3.

d. f.
At 6 : 2 per lb. what per C. ?

$$\begin{array}{r} \text{ss.} \\ 6) 26 \\ 4 : - : 8 \end{array}$$

Answer 3.0 : - : 8

Example 4.

d. C.
At 10 per lb. what ?

$$\begin{array}{r} \text{ss.} \\ 6) 40 \\ 6 : 1 : 4 \end{array}$$

Answer 4.6 : 1 : 4

See Exam. 15, p. 150.

Example 5.

d. f. C.
At 17 : 3 per lb. what ?

$$\begin{array}{r} \text{ss.} \\ 6) 71 \\ 11 : 1 : 8 \end{array}$$

Answer 8.2 : 1 : 8

See Exam. 41, p. 122.

Example 6.

d. f.
At 20 : 2 per lb. what per C. ?

$$\begin{array}{r} \text{ss.} \\ 6) 82 \\ 13 : 1 : 4 \end{array}$$

Answer 9.5 : 1 : 4

Example

Example 7.

d. f. C.
At 12 : 1 per lb. what cost 4 ?

49 ss.

4 C.

6) 196

32 : 1 : 4

Answer 22.8 : 1 : 4

Example 8.

d. f. C.
At 9 : 3 per lb. what cost 32 ?

ss.

39

8

$$\left. \begin{array}{r} 312 \\ 4 \end{array} \right\} 32 \text{ C.}$$

6) 1248

208

Answer 145.6

Example 9.

d. f. C.
At 4 : 1 per lb. what cost 38 ?

38 C.

17 ss.

6) 646

107 : 1 : 4

Answer 75.3 : 1 : 4

To find

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with 1

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To

To find the value of 1 C. if the price of an Ounce be given.

Work as in the three last Examples, only multiply with 16 Ounces instead of the C.

Examples:

d. f. C.
At 5 : 1 per oz. what cost 1?

21 ss.
16 oz.

6) 336
56

Answer 39.2

d. f.
At 11 : 2 per oz. what cost 1 C.?

46 ss.
16 oz.

6) 736
122 : 1 : 4

Answer 85.8 : 1 : 4

When the price of 1 C. is given, to find the Price of 1 lb.

R U L E.

First find the value of 16 lb. by taking a 7th part of the Price, which being Subtracted from the Price, gives the value of 96 lb. then dividing by 96 gives the Answer to 1 lb.

Note, You may divide Two-shillings's by 96 at sight, with supposing them to be Farthings,

Example

Example 1, and proof to Example 6, page 317.

	l.	s.	d.	
At 9	:	11	:	4 per C. what per lb.?
	ss.	s.	d.	
7) 95	:	1	:	4
Sub. 13	:	1	:	4
82	:	-	:	-

} the value of { $\begin{matrix} 16 \\ 96 \end{matrix}$ lb. which value being reckoned as Farthings gives the Answer to 1 lb. viz. 20 d. 2 f.

Example 2, and proof to Example 4, page 317.

	l.	s.	d.	
At 4	:	13	:	4 per C. what per lb.?
	ss.	s.	d.	
7) 46	:	1	:	4
	6	:	1	:
				4 Subtracted.
40	:	-	:	-

Answer 40 f. or 10 d.

Example 3.

	l.	s.	d.	
At 2	:	10	:	9 per C. what per lb.?
	ss.	s.	d.	
7) 25	:	-	:	9
	3	:	1	:
				3 Subtracted.
21	:	1	:	6

Answer 21 f. 3 q. or 5 d. 1 f. 3 q.

Observe, in the last Example as I suppose the 21 ss. to be 21 f. therefore 1 s. will be but a half Farthing, and 6 d. a Quarter.

Example

Example 4.

At 8 : 10 per C. what per lb. ?

$$\begin{array}{r} 7) 85 \\ \text{Subtract } 12 : - : 3 \text{ and a Rem.} \\ \hline 72 : 1 : 8 \end{array}$$

Answer 72 f. or 18 d. and rather more
 an 3 q. of a Farthing.

Here I divide no further than the Pence, for 6 d.
 only reckoned 1 q. of a Farthing ; therefore if there
 a remainder at the Pence, I omit it, and pay one
 the Pence before I Subtract.

Example 5.

At 4 : 17 per C.
 what per lb. ?

$$\begin{array}{r} 48 : 1 \\ 6 : 1 : 10 \text{ and a rem;} \\ \hline 41 : 1 : 1 \end{array}$$

Answer 41 f. 2 q.

Example 6.

At 3 : 12 : 8 per C.
 what per lb. ?

$$\begin{array}{r} 36 : - : 8 \\ 5 : - : 4 \text{ & a rem.} \\ \hline 31 : - : 3 \end{array}$$

Answer 31 f. fully.

See Example 79, page 139.

Or you may work these Sums thus ; first bring
 the price into a Decimal, then work as before.

Q Q

Example

Example 7.

l. s.
At 1 : 15 per C.
what per lb.?

$$\begin{array}{r} 7) 1.75 \\ \text{.25 Subtracted:} \\ \hline 1.5 \end{array}$$

Answer 15 f.

Example 8.

l. s.
At 4 : 17 per C.
what per lb.?

$$\begin{array}{r} 7) 4.85 \\ \text{Sub. .692} \\ \hline 4.15 \end{array}$$

Answer 41 f. and half

See Example 5, last page

Observe, as the Pounds place and the first place of Decimals are so many Two-shillings's; therefore reckon them Farthings as usual, and the Decimals which comes after, shews what part of a Farthing

And if there be one Decimal place besides the Two-shillings's, it gives the Answer so exact as not to want a 10th part of a Farthing.

Example 9.

l. s.
At 1 : 13 per C.
what per lb.?

$$\begin{array}{r} 7) 1.65 \\ \text{Sub. .235} \\ \hline 1.41 \end{array}$$

Answer 14 f. fully.

Example 10.

l. s. d.
At 3 : 15 : 6 per C.
what per lb.?

$$\begin{array}{r} 7) 3.775 \\ \text{Subtract .539} \\ \hline 3.23 \end{array}$$

Answer 32 f. 1 q. fully

See Example 3, page 219.

To find the Decimal to any part of a Unit by taking parts.

Examples.

What is the Decimal of 14 lb. a C. being the Unit?

14 | 2) .25 Decimal of 1 ℥.

.125 Answer:

What is the Decimal of 7 lb. a C. being the Unit?

lb. Or thus,
4 | 2) .25 Decimal of 1 ℥. | 7 | 2) .125 Dec. of a half ℥.

.0625 Answer.

Answer. .0625 as before.

What Decimal parts of a C. are equal to 16 lb.?

lb C.
16 | 7) 1.00000

Answer .14285, &c.

What Decimal parts of a C. are equal to 12 lb. | What Decimal of a C. is equal to 8 lb.?

lb.
12 | 7) .75 for 3 ℥.

.10714 Answer.

lb.
8 | 7) .5 for 2 ℥.

.071428 Answer:

What

What Decimal of a C. is 4 lb. ?

$$4 \overline{) .25} \text{ for } 1 \text{ Q.}$$

.03571 Answer.

What Decimal of a C. is 1 Q. 6 lb. ?

$$\begin{array}{r} 4 \overline{) .25} \text{ for } 1 \text{ Q.} \\ 2 \overline{) .03571} \\ \hline .01785 \end{array}$$

.30356 Answer.

What Decimal of a C. is 2 Q. 9 lb. ?

$$\begin{array}{r} 8 \overline{) .5} \text{ for } 2 \text{ Q.} \\ 1 \overline{) .07142} \\ \hline .00892 \end{array}$$

.58034 Answer.

What's the Decimal of 2 lb. a C. being the Unit lb.

$$2 \overline{) .125} \text{ for } 14 \text{ lb.}$$

Answer .017857 if this Decimal be multiplied

$\left\{ \begin{array}{c} 3 \\ 5 \\ 6 \end{array} \right\}$	$\left\{ \begin{array}{c} 6 \\ 10 \\ 12 \end{array} \right\}$
by $\left\{ \begin{array}{c} 9 \\ 10 \end{array} \right\}$	it gives the $\left\{ \begin{array}{c} 18 \\ 20 \end{array} \right\}$
$\left\{ \begin{array}{c} 11 \\ 12 \\ 13 \end{array} \right\}$	Decimal of $\left\{ \begin{array}{c} 22 \\ 24 \\ 26, \text{ \&c.} \end{array} \right\}$

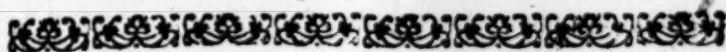
What's the Decimal of 22 lb. a C. being the Unit

$$.017857 \text{ Decimal of } 2 \text{ lb. as before}$$

.392727 Answer.

What's the Decimal of 20 *lb.* a *C.* being the Unit?

First set down the Decimal for 2 *lb.* then instead of multiplying by 10, remove the prop a figure nearer the right hand, thus; .0.17857



PRACTICE.

WHEN the price is any number of Pence with one or more Cyphers at the right hand, as 20 *d.* 300 *d.* 150 *d.* &c. to find the value of any Quantity.

R U L E.

Fix the same number of Cyphers to the right hand of the Yards, *lb.* &c. as there are at the right hand of the Pence; and then work for such number of Pence as the price would be without the Cyphers, and you have the Answer.

Examples.

	<i>Yd.</i>	<i>d.</i>	<i>s.</i>		<i>Yd.</i>	<i>d.</i>	<i>s.</i>	<i>d.</i>			
<i>d.</i>	426	at	300	or	25	<i>d.</i>	291	at	800	or	66 : 8
3 8)	42600				8 3)	29100					

Answer 532.5

970.0 Answer.

Yd. *d.* *s.* *d.*

642 at 150 or 12 : 6

6420

5

8) 32100 Three-pences.

Ans. 401.2 : 1

This Example explain'd: there being one Cypher at the right hand of the Price in Pence, I fix it to the right hand of the Yards, then I work as if the price was at 15 *d.* by Reduction.

*A new method of stating all Questions in the Golden Rule, whether Single or Double * Direct or Inverse, so that the Answer may be given at one Operation; taken out of the Grubstreet Journal, No. 107 in the Year 1731, in which the Author expresses himself thus, viz.*

NOTWITHSTANDING the great perfection, to which ARITHMETICK is now brought, in multitudes of Writers from Bishop *Tonkal*, down to Col. *Ayer*; the grand Rule of that excellent Science deservedly called the **GOLDEN RULE**, remains yet unfinished. As it now stands, it is so perplexed and defective, that there are few learners but are strangely at a loss in stating of most Questions, and for the solving of many they have no directions at all

But the following is a Method which will render the Practice of the Rule of **THREE** in it's utmost extent, abundantly more Easy, Certain and Useful.

The only difficulty is to distinguish in the terms of a Question, the producing from the produced. Producing terms are such as jointly produce any effect, *e g.* whatever is considered as a Cause, with the adjuncts (or additional circumstances) of Time, Distance, Length, Breadth, Depth, &c. produced terms are such as are connected with the others under the character of Price, Produce, Provision, Gain, Loss, Interest, Advantage, Value or Quantity of Work, &c.

These things being premised, there will be no difficulty in the following account of

A

* Observe, the words *Direct* and *Inverse* above, not being spoken of before in this Treatise, their meaning is this, viz. a Question in the Golden Rule is *Direct* when the second and third Numbers are to be multiplied together, &c. and *Inverse* when the first and second Numbers are to be multiplied together, &c.

A new Method of answering one way, and at one stating, all manner of Questions in the Rule of Three.

FIRST place the conditional terms in one line, in any order, and their corresponding terms under each respectively.

Then having, if necessary prepared the terms, (by bringing the heterogeneous (or those of divers denominations) to one denomination, and the corresponding to the same) multiply the producing terms of one line by the produced of the other, for a dividend; and the rest of the terms together for a divisor; the quotient will be the term required of the same denomination with the term over the blank.

For instance (I) in the Single Rule (1) Direct: What is the price of 6 Yards at the rate of 5 s. for 3 Yards? (2) Inverse, How much Stuff yard broad, will line 10 yards of Cloth, yard and quarter broad? (II) in the Double Rule (i) of five terms (3) Direct. What is the Interest of 200 l. for 18 Months, at the rate of 6 l. per Cent per Annum? (4) Inverse: At the rate of 50 s. for 50 l. in 10 Months, what is the principal of 6 l. for 12 Months? (ii) or more terms (5) There is 48000 l. worth of Provision to be distributed among 1600 Men for 40 Days at ten Pennyworth a Man a Day; I demand, if the same was to be distributed among 800 Men, how much would come to each Man a Day for 20 Days.

The stating of these Questions, according to this Method is so easy and obvious, that even learners will be before hand with me in observing that the produced term (1) in the first Question is 5 s. (2) in the second none at all, as generally happens in the Single Rule Inverse; in which case in each line instead thereof substitute an unit, or which will amount to the same, only multiply the terms of the former line for a Dividend, and the term of the other or the product of it's terms will be the Divisor; (3) in the third

third 6 l. Interest ; (4) in the fourth 50 s. and 6 l. Interest ; (5) in the fifth 48000 l. so the placing will consequently be in the

$$(1) \left\{ \begin{array}{c} s. \quad r. \\ 5-3 \\ 6 \end{array} \right\} \text{ or } \left\{ \begin{array}{c} r. \quad s. \\ 3-5 \\ 6 \end{array} \right\} \begin{array}{l} 5 \text{ multiplied by } 6 \text{ is } 30 \text{ dividend} \\ \text{---} \quad \text{---} \quad 3 \text{---} \text{ Divisor.} \end{array}$$

$$(2) \left\{ \begin{array}{c} q. \quad r. \\ 1-5 \text{ br.---} \\ 1 \quad 4 \end{array} \right\} 10 \text{ lo. } \left\{ \begin{array}{c} r. \quad q. \\ 10 \text{ lo.---} \\ 4 \quad 1 \end{array} \right\} 5 \text{ br.---} \text{ or, } \&c.$$

Examples:

lb. *s.* *d.*
If 6 of Gumarabick cost 5 : 10 what must I give for 57 *lb.* ?

$$\begin{array}{r} \text{lb.} \quad \text{s.} \quad \text{d.} \\ 6 \text{---} 5 : 10 \\ 57 \quad 6 \\ \hline 35 \text{ dd.} \end{array}$$

$$\begin{array}{r} 57 \text{ lb.} \\ \text{---} 7 \text{ } \\ 399 \text{ } \\ 5 \text{ } \end{array} \left. \vphantom{\begin{array}{r} 57 \text{ lb.} \\ \text{---} 7 \text{ } \\ 399 \text{ } \\ 5 \text{ } \end{array}} \right\} 35 \text{ dd.}$$

$$6) 1995$$

$$(2) \quad 332 \text{ dd. } 1 \text{ d.}$$

Answer 2.7 : 1 2 5

If

If I give
give for
Piece 37

S

The

In this
Rule
and 7 oz
reduced
together
at a Di

If I give 9 s. 6 d. for 3 Yards of Cloth, what must I give for 8 Packs, each containing 9 Pieces, and each Piece 37 Yards?

s.	d.	Yd.	
9	6	— 3	Ps. Pks.
3		37	: 9 : 8

Six-pences	19	Yd.
		37
		19 Six-pences.

703
9 Ps.

6327
8 Packs.

Yd. 3)	50616
--------	-------

4)	16872	Six-pences.
----	-------	-------------

421.8	Answer.
-------	---------

The 2d Example in page 180, stated thus,

s.	d.	d.	oz.
8	6	— 1	— 7
s.	d.	d.	
5	8	— 9	

In this Example the produced terms according to the Rule are 1 d. and 9 d. Loaves; therefore 8 s. 6 d. and 7 oz. are the producing of one line, and 9 d. the produced of the other, which are to be multiplied together for a Dividend, and the rest of the terms for a Divisor, which work will be the same as before.

The 4th Example in page 181, stated thus;

Pecks.	Horses.	Days.
400	15	14
	Horses.	Days.
	500	20

Here the 400 Pecks being Provision, according to the Rule is the produced term; therefore it must be multiplied with the producing of the other line, viz. 500 Horses and 20 Days for a Dividend, and the other terms must be multiplied together for a Divisor and the Answer will be as before.

MENSURATION.

OF Mensuration there are three kinds, viz.
1st. Lineal, call'd running Measure, because it respects length only.

2^d. Superficial, Flat, or Square Measure, being length and breadth.

3^d. Solid, or Cube Measure, being length, breadth and thickness.

CASE 1.

Of Lineal Measure.

The Content of Lineal Measure is given by only measuring with a Scale, and therefore I shall pass it.

CASE 2.

Of Superficial Square or Flat Measure.

To Square any number is to multiply it into itself as suppose you would know how many Square Feet in 1 Yard square, multiply 3 the Feet in one Yard lineal into itself, that is, 3 times 3; the product 9, and so many Feet make a Yard Square.

Again, to know how many Inches are contained in a Square Foot, there being 12 Inches in a Foot lineal, you must multiply 12 into itself, which produces 144 Square Inches the Answer.

Therefore

There
breadth
Content
annexed
Glaſs
length and
together
Answer.
To n
observe

As the
breadth,
inches;
the other
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A Bo
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Here I
being only
or 3 In
multipl

Therefore multiplying the length and breadth together gives the Superficial Content, as is easily seen in the figure annexed; for suppose the figure to be a Glass Window containing 6 Panes in length and 5 in breadth, when multiplied together they give 30 Panes the Answer.



To multiply Feet and Inches by Feet and Inches observe this

R U L E.

As there are two Dimensions, *viz.* the length and breadth, which are commonly given in Feet and Inches; multiply either Dimension by the Feet of the other; and for the odd Measure take such a part of the Dimension to be multiplied, as the odd Measure is of a Foot; and if occasion be, part of that part.

Examples.

A Board 12 Feet long, and 14 Inches broad, how many Square Feet?

F. I.

1 : 2 broad.

12 F. long.

Answer F. 14 :—

A Board 17 Feet long, and 1 Foot 3 Inches broad, how many Square Feet?

I. F. I.

3|4) 17 : — long.

4 : 3

21 : 3 Answer.

Here I make the breadth the multiplier, and there being only 1 Foot it doth not multiply, then I take for 3 Inches, and add in the top line instead of multiplying by one Foot.

Observe,

Observe, in dividing Inches if any remains, bring the Inch into 12 parts, and divide again, &c. then in adding or multiplying, you carry one for every 12, in every Denomination but the last.

A Piece of Wainscot 16 Feet 7 Inches long, and 9 Feet 5 Inches broad, how many Square Yards?

I. F. I. F. I.

4|3) 16 : 7 by 9 : 5
9 F.

I. 149 : 3

1|4) 5 : 6 : 4
1 : 4 : 7

9) 156 : 1 : 11

Answer 17 Yd. 3 Feet, 1 Inch, 11 parts.

A Board being 16 Inches broad, how many Inches in length will make a Square Superficial Foot?

Divide 144 (the Inches in a Square Foot) by the breadth of the board, thus

16) 144 (9 I. *Answer*.

C A S E 3.

Of Solid Measure.

Solids. such as Stone, Timber, &c. are measured by the Cubick or Solid Foot : now a Cube is a Figure like a Dye of 6 equal sides.

To find the Content observe this

R U L E.

First, find the Superficial Content in Feet, as in the last Case ; then multiply that by the Thickness or Depth, and you have the Answer.

Or multiply any two Dimensions together, and that Product multiply by the other Dimension for the Answer. A

A Stone 7 Feet 5 Inches long, 3 Feet 2 Inches broad, and 3 Feet 4 Inches deep, how many Solid Feet?

I. F. I. F. I.

2|6) 7 : 5 by 3 : 2
3 F.

22 : 3

1 : 2 : 10

I. F. I.

4|3) 23 : 5 : 10 by 3 : 4
3 F.

70 : 5 : 6

7 : 9 : 11 : 4

Answer F. 78 : 3 : 5 : 4

A Stone 7 Feet 3 Inches long, 4 Feet 5 Inches broad, and 2 Feet 3 Inches deep, how many Solid Feet?

I. F. I. F. I.

3|4) 4 : 5 by 7 : 3
7 F.

30 : 11

1 : 1 : 3

F. I.

I. 32 : — : 3 by 2 : 3

3|4) 32 : — : 3
8 : — : — : 9

Answer F. 72 : — : 6 : 9

A Piece of Timber 16 Feet long, 14 Inches broad, and 9 Inches deep, how many Solid Feet?

I. F.

3|4) 16 by 9 Inches.

4 Subtract and you have the

I. ——— (Product by 9 Inches.

2|6) 12 F. by 1 F. 2 I.

2

Answer 14 F.

A Piece of Timber 7 Feet long, 7 Inches broad, and 4 Inches deep, how many Solid Feet?

I. I. I.

4|3) 7 — by 4

2 : 4 by 7 F.

7 F.

Answer 1 : 4 : 4

F. I. p.

How many Solid Feet are there in one Solid Yard, that is, if a stone be 3 Feet broad, 3 Feet long, and 3 Feet deep, how many Solid Feet?

F. F.

3 by 3

3 F.

In a Square Superficial Yard are 9 F. by 3 F.

3 F.

Answer 27 F.

Note, When the Answer is to be given in Solid Yards, you only divide the Solid Feet by 27. A

A Vault dug 17 Feet 6 Inches deep, 3 Feet 4 Inches broad, and 5 Feet 7 Inches long, how many Solid Yards?

$$\begin{array}{r} \text{I.} \quad \text{F.} \quad \text{I.} \quad \text{F.} \quad \text{I.} \\ 4|3) \quad 17 : 6 \text{ by } 3 : 4 \\ \quad \quad \quad 3 \text{ F.} \end{array}$$

$$\begin{array}{r} \text{52 : 6} \\ \text{5 : 10} \end{array}$$

$$\begin{array}{r} \text{I.} \quad \text{F.} \quad \text{I.} \\ 6|2) \quad 58 : 4 \text{ by } 5 : 7 \\ \quad \quad \quad 5 \text{ F.} \end{array}$$

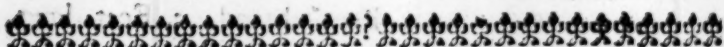
$$\begin{array}{r} \text{I.} \quad 291 : 8 \\ 1|6) \quad 29 : 2 \end{array}$$

$$4 : 10 : 4$$

$$\begin{array}{r} \text{Yd.} \quad \text{F.} \quad \text{I.} \text{ parts.} \\ 27) \quad 325 : 8 : 4 \quad (12 : 1 : 8 : 4 \text{ Answer,} \end{array}$$

$$\begin{array}{r} .55 \end{array}$$

$$\begin{array}{r} .1 \text{ F.} \end{array}$$



To Measure Land with a Chain.

THE Statute Measure is 5 Yards and 2 Quarters, the *Lancashire* 7 Yards, and the *Cheshire* 8 Yards, to a Pole, Perch or Rod.

Every Chain is divided into 100 parts or Links, and is four Perches long : so that the Statute Chain is 22 Yards in length, the *Lancashire* 28 Yards, and the *Cheshire* 32 Yards.

Ten Chains or 40 Perches in length, and 1 Chain or 4 Poles in breadth, is an Acre, that is 160 Perches, 40 the length being multiplied by 4 the breadth.

So

So that the content of an Acre (which consists of 4 Roods, each Rood 40 Perches) is 100000 Links, for 10 Chains in length is 1000 Links, and that multiplied by the breadth 1 Chain or 100 Links produces 100000.

Now to find the number of Acres contain'd in any given number of Chains and Links :

First, Set down the number of Chains and Links without any distinction, always putting the Chains in the place of Hundreds, and interposing a Cypher if there are not 10 Links, and that will be the number of Links contain'd in them, without the trouble of any operation; as 25 Chains 30 Links are 2530 Links, 1 Chain and 6 Links are 106 Links, as may be seen by multiplying the Chains by 100, and taking in the Links :

Secondly, Multiply the length by the breadth, the product is the number of Links contain'd in the whole, from which cut off the 5 last figures towards the right-hand (which is the same thing as dividing it by 100000 the number of Links contain'd in an Acre) and you have at once the number of Acres and the Decimal parts thereof.

As for Example,

Suppose a Field be 25 Chains and 30 Links long and 1 Chain 6 Links broad, to find the content in Acres, you have no more to do than this,

$$\begin{array}{r}
 2530 \\
 \times 106 \text{ Multiplier.} \\
 \hline
 1518
 \end{array}$$

Acres 2.63180 *Answer.*

S s

To

To reduce Lancashire into Cheshire or Statute Acres, and the Contrary.

R U L E.

State the Question thus, *viz.* Let the number of Acres to be reduced, be in the second place; the square of that length, which goes to a Pole of the same Country measure, in the first place; and the square of that measure, which goes to a Pole of the same as the Answer is to be of, in the third place: then work by the *Golden Rule*.

Examples.

Reduce 25 Cheshire Acres into Lancashire Acres.

Yards.	Acres.	Yards.
64	25	49
	8	
	—	
	200	
	8	
	—	
	7) 1600	
	—	
	7) 228.571	
	—	
	32.653	

Answer 32 Acres and .653 being valued by multiplying by 160 the Poles in 1 Acre, gives 104 Poles and near a half.

Reduce

Reduce 37 Cheshire into Statute Acres.

Square half Yards.	Acres.	Square half Yards.
256	37	121
37		
1792		
768		
11) 9472		
11) 86109		
Acres 78.28 <i>Answer</i>		

This Example explain'd.

The Statute Pole is 11 half Yards, and squared is 121 for the third number; then the Cheshire half Yards in a Pole are squared for the first number, &c.

F I N I S

Reference to the following pages

1. The first page of the report

2. The second page of the report

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